



# Aviation Structural Mechanic E 2

Only one answer sheet is included in the NRTC. Reproduce the required number of sheets you need or get answer sheets from your ESO or designated officer.

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0503LP2138300

Although the words "he," "him," and "his" are used sparingly in this manual to enhance communication, they are not intended to be gender driven nor to affront or discriminate against anyone reading this material.

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PENSACOLA FL 32509-5237

Errata No. 2  
Stock Ordering No.  
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3 February 1993

Specific Instructions and Errata for  
Nonresident Training Course

Aviation Structural Mechanic E 2  
NAVEDTRA 80401

1. TO OBTAIN CREDIT FOR DELETED QUESTIONS, SHOW THIS ERRATA TO YOUR LOCAL COURSE ADMINISTRATOR (ESO/SCORER). THE LOCAL COURSE ADMINISTRATOR (ESO/SCORER) IS DIRECTED TO CORRECT THE ANSWER KEY FOR THIS COURSE BY INDICATING THE QUESTIONS DELETED.
2. This errata supersedes all previous errata. No attempt has been made to issue corrections for errors in typing, punctuation, and so forth, which do not affect your ability to answer the questions.
3. Assignment Booklet, NAVEDTRA 80401

Delete the following questions and leave the corresponding spaces blank on the answer sheets.

Questions

4-61  
5-41  
7-50  
7-51

Make the following changes:

Question

Change

1-25

In the question, line 3, change the word "compressurization" to "overpressurization."

1-51

In choice 4, change "chamber A" to "chamber C."

1-65

In choices 2 and 4, change "psi" to "psia."



0503LP2138302

Question

Change

2-50	In column A, under "Functions" change to read "Operates on nitrogen pressure received from the canopy pneumatic control module and canopy pneumatic timer."
3-6	In choice 4, change "The vent bleeder valve" to read "The vent bleeder check valve."
3-10	In choice 4, add "above pressure regulator" after "psi."
4-34 to 4-38, Instructions for	For questions 4-34 through 4-38, refer to "FIGURE 3-2" instead of "FIGURE 4-2."
5-48	In choice 2, "change the word "slack" to read "black."
7-7	In choice 4, change the word "ON" to read "Test mask."
8-31	In choice 3, change "115/120" to "115/200."

# AVIATION STRUCTURAL MECHANIC E 2

## NAVEDTRA 80401

Prepared by the Naval Education and Training Program Management  
Support Activity, Pensacola, Florida

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Congratulations! By enrolling in this course, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this self-study course is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program. You have taken an important step in self-improvement. Keep up the good work.

### HOW TO COMPLETE THIS COURSE SUCCESSFULLY

ERRATA: If an errata comes with this course, make all indicated changes or corrections before you start any assignment. Do not change or correct the Training Manual (TRAMAN) or assignments in any other way.

TEXTBOOK ASSIGNMENTS: The TRAMAN for this course is Aviation Structural Mechanic E 2, NAVEDTRA 10401. The TRAMAN pages that you are to study are listed at the beginning of each assignment. Study these pages carefully before attempting to answer the questions in the course. Pay close attention to tables and illustrations because they contain information that will help you understand the text. Read the learning objectives provided at the beginning of each chapter or topic in the text and/or preceding each set of questions in the course. Learning objectives state what you should be able to do after studying the material. Answering the questions correctly helps you accomplish the objectives.

BLACK DOT INFORMATION: Black dots (●) may be used in the text and correspondence course to emphasize important or supplemental information and to highlight instructions for answering certain questions. Read these black dot entries carefully; they will help you answer the questions and understand the material.

SELECTING YOUR ANSWERS: After studying the text, you should be ready to answer the questions in the assignment. Read each question carefully, then select the BEST answer. Be sure to select your answer from the subject matter in the TRAMAN. You may refer freely to the TRAMAN and seek advice and information from others on problems that may arise in the course. However, the answers must be the result of your own work and decision. You are prohibited from referring to or copying the answers of others and from giving answers to anyone else taking the same course. Failure to follow these rules

can result in suspension from the course and disciplinary action by the Commander, Naval Military Personnel Command.

SUBMITTING COMPLETED ANSWER SHEETS: It is recommended that you complete all assignments as quickly as practicable to derive maximum benefit from the course. However, as a minimum, your schedule should provide for the completion of at least one assignment per month--a requirement established by the Chief of Naval Education and Training. Failure to meet this requirement could result in disenrollment from the course.

TYPES OF ANSWER SHEETS: If you received Automatic Data Processing (ADP) answer sheets with this course, the course is being administered by the Naval Education and Training Program Management Support Activity (NETPMSA), and you should follow the instructions in paragraph A below. If you did NOT receive ADP answer sheets with this course, you should use the manually scored answer sheets attached at the end of the course and follow the directions contained in paragraph B below.

#### A. ADP Answer Sheets

All courses administered by the NETPMSA include one blank ADP answer sheet for each assignment, for proper computer processing, use only the original ADP answer sheets. Reproductions are not acceptable.

Recording Information on the ADP Answer Sheets: Follow the "MARKING INSTRUCTIONS" on the answer sheet. Be sure that blocks 1, 2, and 3 are filled in correctly. This information is necessary for your course to be properly processed and for you to receive credit for your work.

As you work the course be sure to mark your answers in the course booklet because your answer sheets will not be returned to you. When you have completed an assignment, transfer your answers from the course booklet to the answer sheet.

Mailing the Completed ADP Answer Sheets: As you complete each assignment, mail the completed ADP answer sheet to:

Commanding Officer  
Naval Education and Training  
Program Management  
Support Activity  
Pensacola, FL 32509-5000

The answer sheets must be mailed in envelopes, which you must either provide yourself or get from the local Educational Services Officer (ESO). You may enclose more than one answer sheet in a single envelope. Remember, regardless of how many answer sheets you submit at a time, the NETPMSA should receive at least one a month. NOTE: DO NOT USE THE COURSE COMMENTS PAGE AS AN ENVELOPE FOR RETURNING ANSWER SHEETS OR OTHER COURSE MATERIALS.

Grading: The NETPMSA will grade your answer sheets and notify you by letter of any incorrect answers. The passing score for each assignment is 3.2. Should you get less than 3.2 on any assignment, a blank ADP answer sheet will be enclosed with the letter listing the questions incorrectly answered. You will be required to redo the assignment and resubmit a new completed answer sheet. The maximum score that can be given for a resubmitted assignment is 3.2.

Course Completion: When you complete the last assignment, fill out the "Course Completion" form in the back of the course and enclose it with your last answer sheet. The NETPMSA will issue you a letter certifying that you satisfactorily completed the course. You should make sure that credit for the course is recorded in your service record.

Student Questions: Any questions concerning this course should be referred to the NETPMSA by mail using the address listed above or by telephone: AUTOVON 452-1259 or commercial (904) 452-1259.

#### B. Manually Scored Answer Sheets

If you did not receive ADP answer sheets with this course, it is being administered by your local command and you must use the answer sheets attached at the end of the course booklet.

Recording Information on the Manually Scored Answer Sheets: Fill in the appropriate blanks at the top of the answer sheet. This information is necessary for your course to be properly processed and for you to receive credit for your work. As you work the course, be sure to mark your answers in the course booklet, because your answer sheets will not be returned to you. When you have completed an assignment, transfer your answers from the course booklet to the answer sheet.

Submitting the Completed Manually Scored Answer Sheets: As you complete each assignment, submit the completed answer sheet to your ESO for grading. You may submit more than one answer sheet at a time. Remember, you must submit at least one assignment a month.

Grading: Your ESO will grade the answer sheets and notify you of any incorrect answers. The passing score for each assignment is 3.2. Should you get less than 3.2 on any assignment, the ESO will not only list the questions incorrectly answered but will also give you a pink answer sheet marked "RESUBMIT." You will be required to redo the assignment and complete the "RESUBMIT" answer sheet. The maximum score that can be given for a resubmitted assignment is 3.2.

Course Completion: After you have submitted all the answer sheets and have earned at least a 3.2 on each assignment, your command will give you credit for this course by making the appropriate entry on Page 4 of your service record.

Student Questions: Any questions concerning the administration of this course should be referred to your ESO.

#### NAVAL RESERVE RETIREMENT CREDIT

This course is evaluated at 15 Naval Reserve retirement points. Points will be credited in units upon satisfactory completion of the assignments as follows:

Unit1: 12 points upon satisfactory completion of assignments 1 through 7.

Unit 2: 3 points upon satisfactory completion of assignments 8 and 9.

The date of completion for this course or units is the date processed through the NETPMSA ADP System, and not the day deposited in the mail. Answer sheets and "Course Completion" forms submitted by reserve personnel should be

mailed at least 60 days prior to their anniversary date.

#### COURSE OBJECTIVE

By completing this course, you will demonstrate a knowledge of the following subject matter; Utility systems; canopy systems; pressurization and air-conditioning systems; oxygen systems; oxygen support equipment; and ejection seat systems.

Naval courses may include several types of questions—multiple-choice, true-false, matching, etc. The questions are not grouped by type but by subject matter. They are presented in the same general sequence as the textbook material upon which they are based. This presentation is designed to preserve continuity of thought, permitting step-by-step development of ideas. Not all courses use all of the types of questions available. The student can readily identify the type of each question, and the action required, by inspection of the samples given below.

### MULTIPLE-CHOICE QUESTIONS

Each question contains several alternatives, one of which provides the best answer to the question. Select the best alternative, and blacken the appropriate box on the answer sheet.

#### SAMPLE

s-1. Who was the first person appointed Secretary of Defense under the National Security Act of 1947?

1. George Marshall
2. James Forrestal
3. Chester Nimitz
4. William Halsey

Indicate in this way on the answer sheet:

	1	2	3	4	
	T	F			
s-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_ _ _

### TRUE-FALSE QUESTIONS

Mark each statement true or false as indicated below. If any part of the statement is false the statement is to be considered false. Make the decision, and blacken the appropriate box on the answer sheet.

#### SAMPLE

s-2. All naval officers are authorized to correspond officially with any systems command of the Department of the Navy without their respective commanding officer's endorsement.

1. True
2. False

Indicate in this way on the answer sheet:

	1	2	3	4	
	T	F			
s-2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_ _ _

### MATCHING QUESTIONS

Each set of questions consists of two columns, each listing words, phrases or sentences. The task is to select the item in column B which is the best match for the item in column A that is being considered. Items in column B maybe used once, more than once, or not at all. Specific instructions are given with each set of questions. Select the numbers identifying the answers and blacken the appropriate boxes on the answer sheet.

#### SAMPLE

In questions s-3 through s-6, match the name of the shipboard officer in column A by selecting from column B the name of the department in which the officer functions. Some responses maybe used once, more than once, or not at all.

#### A. OFFICER

#### B. DEPARTMENT

s-3. Damage Control Assistant

Operations Department

s-4. CIC Officer

Engineering Department

s-5. Disbursing Officer

Supply Department

s-6. Communications Officer

Indicate in this way on the answer sheet:

	1	2	3	4	
	T	F			
s-3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_ _ _
s-4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_ _ _
s-5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_ _ _
s-6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_ _ _



# Assignment 1

Textbook Assignment: "Utility Systems." Pages 1-1 through 1-23.

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Learning Objective: *Recognize the operating principles and functions of auxiliary bleed-air utility Systems.*

- 1-1. In addition to furnishing air for air-conditioning and pressurization system, auxiliary bleed air also supplies air for which of the following actions or systems?
1. Electronic equipment cooling
  2. Windshield washing, anti-icing
  3. Anti-g system
  4. Each of the above
- 1-2. Auxiliary system bleed air can range up to what maximum temperature and pressure?
1. 100°F and 50 psi
  2. 200°F and 90 psi
  3. 400°F and 125 psi
  4. 600°F and 150 psi
- 1-3. The windshield anti-ice/rain removal system is designed to provide a means of maintaining visibility from the aircraft.
1. True
  2. False
- 1-4. What are the three modes of operation controlled by the windshield anti-ice/rain removal switch?
1. Normal, rain, anti-ice
  2. Off, rain, anti-ice
  3. On, anti-ice, rain
  4. Off, on, automatic
- 1-5. The supply air temperature is controlled to a lower limit of 290°F by which of the following?
1. Cooling as it passes through the ducting
  2. Warm air temperature control valve
  3. Warm air temperature sensor
  4. Both 2 and 3 above
- 1-6. The warm air overtemperature sensor actuates when supply air temperature reaches which of the following ranges?
1. 275° ± 50°F
  2. 300° ± 50°F
  3. 375° ± 25°F
  4. 400° ± 75°F
- 1-7. The anti-ice/rain removal air control regulating valve completes the final pressure regulation and flow control before airflow reaches what item?
1. The anti-ice/rain removal nozzle
  2. The anti-ice modulating valve
  3. The windshield
  4. The air temperature control valve
- 1-8. The windshield overheat temperature sensor closes when airflow temperature drops to what minimum level?
1. 290° ± 5°F
  2. 300° ± 10°F
  3. 280° ± 5°F
  4. 250° ± 25°F
- 1-9. Anti-g systems are used to prevent which of the following effects on the pilot?
1. Excessive fatigue
  2. Decreased alertness
  3. Both 1 and 2 above
  4. Air sickness

- 1-10. What is the source of air pressure for the operation of an anti-g system?
1. The emergency survival kit cylinder
  2. The air-conditioning ducting
  3. The engine compressor bleed-air ducting
  4. Either 2 or 3 above, depending on type of aircraft
- 1-11. How many types of anti-g valves are used in naval aircraft?
1. One
  2. Two
  3. Three
  4. Four
- 1-12. What is the maximum pressure provided to the anti-g suit?
1. 1.5 psi
  2. 5.0 psi
  3. 10.0 psi
  4. 11.0 psi
- 1-13. What are the positions of the demand and exhaust valves after the g-forces applied to an aircraft, have stabilized and become constant?
1. Demand valve closed, exhaust valve open
  2. Demand valve closed, exhaust valve closed
  3. Demand valve open, exhaust valve open
  4. Demand valve open exhaust valve closed
- 1-14. In what location in an anti-g system is the filter unit installed?
1. In the outlet port of the anti-g valve
  2. In the supply line to the anti-g valve
  3. In the inlet port of the anti-g valve
  4. Either 2 or 3 above depending on the type of aircraft
- 1-15. A composite quick disconnect may include which of the following service lines?
1. Oxygen and ventilating air
  2. Anti-g system and communications
  3. Both 1 and 2 above
  4. Defog and anti-icing system
- 1-16. What prevents foreign material from entering the anti-g system quick-disconnect hose when it is not in use?
1. A ball check valve
  2. A spring-loaded cover
  3. It is stored in an inverted position
  4. A plastic cap
- 1-17. If the required test equipment is available, dual range anti-g valves may be repaired by AIMDs. Repair of single stage anti-g valves is not recommend.
1. True
  2. False
- 1-18. Which of the following actions should you take after removing and replacing an anti-g filter?
1. Make a logbook entry
  2. Check for free piston movement
  3. Test the relief valve
  4. Check for air leaks
- 1-19. In what range should an operational check be performed on dual range anti-g valves?
1. High range
  2. Low range
  3. Both 1 and 2 above
- 1-20. The vent-air system provides a measure of personal comfort by offsetting discomfort caused by which of the following circumstances?
1. Wearing the antiexposure suit
  2. Heat created by cockpit equipment
  3. High-temperature ambient air
  4. All the above

1.21 Temperature control of the vent-air system is regulated between which of the following ranges?

1. 40°F and 80°F
2. 50°F and 100°F
3. 70°F ± 15° F

1-22. The vent air controller responds to signals from which of the following devices?

1. The vent suit temperature control valve
2. The temperature sensor
3. The temperature selector
4. Both 2 and 3 above

1-23. The range of numbers on the temperature selector thumbwheel is 1-14.

1. True
2. False

1-24. When an aircraft is changing altitude, the temperature is maintained within what tolerance level?

1. A ± 2°F
2. A ± 5°F
3. A ± 10°F
4. A ± 12°

1-25. Which of the following valves protects the vent-air system from accidental compressurization?

1. Check
2. Bypass
3. Restrictor
4. Relief

1-26. Which of the following conditions could occur from the formation of ice on aircraft surface?

1. Decreased lift
2. Additional weight
3. Difficulty in controlling aircraft
4. Each of the above

1-27. How many methods are used on naval aircraft to eliminate or prevent ice formation?

1. One
2. Two
3. Three
4. Four

1-28. Which of the following groups of deicer boots starts to inflate after 30 seconds of an inflation cycle have elapsed?

1. Inboard wing
2. Outboard wing
3. Outboard stabilizer and vertical fin
4. Inboard stabilizer and fin

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IN ITEMS 1-29 THROUGH 1-32, SELECT FROM COLUMN B THE DEICING SYSTEM COMPONENT THAT PERFORMS EACH FUNCTION IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
1-29.	Allows suction to be applied to the deicer boots to hold them down during flight	1. Pressure regulator and relief valve
1-30.	Causes the inlet to the boots to change from suction to pressure when energized	2. Distributor valve
		3. Ejector
1-31.	Maintains the pressure of the bleed air in the deicer system at approximately 18 psi	4. Suction relief valve
1-32.	Provides the necessary suction to deflate the deicer boots	
1-33.	When suction in the manifold lines becomes excessive, the suction relief valve will open and stay open until suction pressure is reduced to approximately what pressure?	
		1. 5 in Hg
		2. 2 in Hg
		3. 6 in Hg
		4. 4 in Hh

- 1-34. What indicates normal system operation of the deicer system?
1. Steady gauge readings of 18 psi and 6 in Hg, respectively
  2. A slight fluctuation of the pointers on the gauges
  3. Steady gauge readings of 1.0 psi and 2 in Hg, respectively
  4. A fluctuation of 10 to 20 psi of the pointers on the gauges
- 1-35. Maintenance of the deice boot system is normally preformed by what ratings?
1. AE
  2. AME
  3. AMS
  4. Each of the above
- 1-36. Which of the following surfaces is not protected by the deice and anti-icing system for the S-3 aircraft?
1. Vertical stabilizer leading edge
  2. Engine nacelle
  3. Ram air inlet
  4. Parts of the engine
- 1-37. What is the purpose for sequencing the bleed-air deicing and anti-icing systems?
1. To control temperature
  2. To control pressure
  3. To minimize bleed air consumption
  4. To prevent air duct overheat
- 1-38. After being used, what happens to anti-icing air?
1. It is returned to the system to be reheated
  2. It is vented overboard
  3. It is routed to the cabin air system
  4. It is returned to the engine
- 1-39. To ensure the flow of bleed air is directed to the appropriate points regardless of the position of movable surfaces, which of the following components are used?
1. Extension ducts
  2. Leakproof rotary joints
  3. Both 1 and 2 above
  4. Special wing fold seals
- 1-40. Which of the following areas should follow the right center wing in proper sequencing of the anti-icing system?
1. Left inboard wing
  2. Left center wing
  3. Right outboard wing
  4. Right horizontal stabilizer
- 1-41. The cyclic valve will remain in the open position for 30 seconds or until the aircraft skin temperature reaches what maximum level?
1.  $35^{\circ} \pm 2^{\circ}\text{F}$
  2.  $50^{\circ} \pm 4^{\circ}\text{F}$
  3.  $60^{\circ} \pm 3^{\circ}\text{F}$
  4.  $100^{\circ} \pm 5^{\circ}\text{F}$
- 1-42. The DEICE-HOT indicator light will come on if aircraft skin temperature exceeds what maximum level?
1.  $75^{\circ} \pm 3^{\circ}\text{F}$
  2.  $100^{\circ} \pm 4^{\circ}\text{F}$
  3.  $200^{\circ} \pm 5^{\circ}\text{F}$
  4.  $300^{\circ} \pm 10^{\circ}\text{F}$
- 1-43. Normal deicing is available in which of the following circumstances?
1. Both engines operating
  2. Single engine operation
  3. Both 1 and 2 above
  4. Engine-start cycle
- 1-44. The deicing system cannot be operated until the anti-ice switch is set to which of the following positions?
1. Deice Hot
  2. Wing - Emp
  3. Eng - pitot
  4. Reset

IN ITEMS 1-43 THROUGH 1-49, SELECT FROM COLUMN A THE FUNCTION PERFORMED BY THE UNIT LISTED IN COLUMN B. UNITS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Units</u>
1-45.	Regulates deicing air pressure when energized	1. Deice pressure regulator Valve
1-46.	Maintains a constant reference pressure when the deice system is operating	2. Wing and empennage deice timing controller
1-47.	Interrupts the operating sequence if the leading edge skin temperature exceeds $60^{\circ} \pm 3^{\circ}\text{F}$	3. Control air pressure regulator 4. Probe sensor temperature transmitter
1-48.	Shuts off deicing air when de-energized	
1-49.	Provides 30-second sequential control signals to each cyclic valve	
1-50.	When the deice pressure regulator is activated, spring pressure is overcome by control air pressurizing which of the following chambers?	1. Chamber A 2. Chamber B 3. Both 1 and 2 above 4. Chamber C
1-51.	When the solenoid valve mounted on the cyclic valve is de-energized, it performs which of the following functions?	1. Vents chamber A air to ambient 2. Vents inlet air to ambient 3. Vents downstream air to ambient 4. Vents inlet air to chamber A

1-52. When a deicing thermostatic switch senses an overheating conditions, it causes which, if any, of the following actions to take place?

1. Deice warning light comes on
2. Deice system shuts down
3. Cold air is added to lower the deice air temp
4. None

1-53. Malfunction of the S-3 aircraft engine anti-icing system primary pressure regulating element is indicated by what system response?

1. A light on the control panel comes on
2. The system automatically shuts clown
3. Extension of a pop-out button on the Valve
4. The formation of ice

1-54. In the event of electrical power failure, the engine anti-icing valve will take what position?

1. Remains in the open position, if open
2. Moves to the "anti-icing ON" position, if closed
3. Either 1 or 2 above depending on position of the valve
4. Moves to the closed position, if open

1-55. The sensing element of the S-3 bleed-air leak detection system will respond to which of the following conditions?

1. Pressure loss
2. Heat
3. Airflow
4. Each of the above

1-56. The test circuit of the bleed-air leak detection system is powered by what voltage level?

1. 400Hz, 115 Vdc
2. 28 Vdc
3. 60 Hz, 115 Vdc
4. 115 Vdc only

- 1-57. In normal operation, the chemical in the bleed-air leak detection element conducts electrical current to activate the indicator light when temperature exceeds what maximum level?
1. 100°F
  2. 225°F
  3. 255°F
  4. 375°F
- 1-50. The bleed air leak detector control contains what number of modules and electrical circuits?
1. 1 module with 2 electrical circuits
  2. 2 modules with 4 electrical circuits
  3. 1 electrical circuit with 2 modules
  4. 2 electrical circuits with 4 modules
- 1-59. The S-3 aircraft air for internal stores heating is provided by what source?
1. Crew compartment exhaust air
  2. Bleed-air deicing and anti-icing supply
  3. Windshield defog supply
  4. Engine 14th stage bleed-air
- 1-60. Cooling air for the F-18 aircraft radar liquid cooling system heat exchanger comes from which of the following sources?
1. Ram air
  2. Air cycle air conditioning system
  3. A cooling fan
  4. Each of the above
- 1-61. Radar liquid coolant fluid for the transmitter is maintained within which of the following temperature ranges?
1. 40°F to 55°F
  2. 60°F to 75°F
  3. 80°F to 90°F
  4. 100°F to 110°F
- 1-62. An electrical ground is provided to the closed side of the liquid cooling ram air valve through which of the following components?
1. Weight on wheels relay
  2. Air data computer, when ram air is hot
  3. Either 1 or 2 above
  4. Low fluid level switch
- 1-62. Excessive contamination of the radar liquid cooling system filter will cause which of the following actions?
1. Bypass valve to open
  2. Extension of a manual reset indicator
  3. Ram air valve to go fully open
  4. System to automatically shutdown
- 1-64. Contamination of the F-18 aircraft waveguide pressurization filter will cause which of the following actions?
1. A relief valve to open and bypass air around the filter
  2. Extension of a manual reset indicator
  3. Ram air valve to go fully open
  4. System to automatically shutdown
- 1-65. Waveguide cavities are pressurized to what maximum pressure?
1. 14 psi
  2. 14 psi
  3. 19 psi
  4. 19 psi
- 1-66. The waveguide pressurization system contains what number of ground test ports?
1. Zero
  2. Two
  3. Three
  4. Four

# Assignment 2

Textbook Assignment: "Utility Systems"; "Canopy Systems." Pages 1-23 through 2-8.

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Learning Objectives:  
*Identify operating principles and maintenance safety precautions for the missile liquid cooling utility system.*

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- |   |  |
|---|--|
| <p>2-1. What type of coolant is used in the F-14 aircraft missile cooling system?</p> <ol style="list-style-type: none"><li>1. Freon</li><li>2. Hydraulic fluid</li><li>3. Dielectric fluid</li><li>4. Methyl alcohol</li></ol> <p>2-2. What component houses the coolant pump and the air-moisture-contaminant remover?</p> <ol style="list-style-type: none"><li>1. Right wing fillet</li><li>2. Right Phoenix missile fairing</li><li>3. Left Phoenix missile fairing</li><li>4. Left wing fillet</li></ol> <p>2-3. The missile coolant pump circulates coolant at what prescribed rate?</p> <ol style="list-style-type: none"><li>1. 8 gallons per minute</li><li>2. 8 gallons per second</li><li>3. 18 gallons per second</li><li>4. 18 gallons per minute</li></ol> <p>2-4. When the missile cooling system is in the warm-up mode, in what positions are the (a) cold air and (b) hot air modulating valves?</p> <ol style="list-style-type: none"><li>1. (a) Open (b) open</li><li>2. (a) Open (b) closed</li><li>3. (a) Closed (b) closed</li><li>4. (a) Closed (b) open</li></ol> <p>2-5. What material is used to cool the missile coolant pump?</p> <ol style="list-style-type: none"><li>1. Refrigerated air</li><li>2. Ram air</li><li>3. System coolant</li><li>4. Freon</li></ol> | <p>2-6. The pneumatic pressure indicator is marked in what units of measure?</p> <ol style="list-style-type: none"><li>1. Degrees Fahrenheit</li><li>2. Pounds per square inch</li><li>3. Pounds per square foot</li></ol> <p>2-7. Which of the following contaminants will the air-moisture-contaminant remover NOT filter from the coolant?</p> <ol style="list-style-type: none"><li>1. Air</li><li>2. Moisture</li><li>3. Foreign particles</li><li>4. Standing water</li></ol> <p>2-8. If the remover filter is clogged, what color but-tan extends as a warning?</p> <ol style="list-style-type: none"><li>1. White</li><li>2. Red</li><li>3. Yellow</li><li>4. Green</li></ol> <p>2-9. Which of the following coolant's should NOT be used in the missile cooling system?</p> <ol style="list-style-type: none"><li>1. Coolanol 25</li><li>2. Coolanol 25R</li><li>3. Flo-cool 108</li><li>4. Flo-cool 180</li></ol> <p>2-10. What is the minimum number of minutes that coolant should be circulated by the aircraft pumps before a sample is taken?</p> <ol style="list-style-type: none"><li>1. Five minutes</li><li>2. Six minutes</li><li>3. Seven minutes</li><li>4. Eight minutes</li></ol> <hr/> <p>Learning Objectives:<br/><i>Identify components of the windshield wiper and washer systems and their functions. Recognize components of the aircraft rain repellent system.</i></p> <hr/> |
|---|--|

- 2-11. The oscillating motion of the windshield wiper system is converted from rotary motion by which of the following parts?
1. Cam assembly
  2. Bell crank assembly
  3. Motion converter
  4. Hydraulic slide valve
- 2-12. Windshield washer solution consists of 20 percent distilled water and what percent additional material?
1. 80 percent soap solution
  2. 80 percent isopropyl alcohol
  3. 80 percent aliphatic naphtha
  4. 70 percent isopropyl alcohol and 10 percent soap solution
- 2-13. The motor/pump assembly for the S-3 aircraft windshield washer is mounted in what location?
1. In the reservoir
  2. Between the reservoir and the filter
  3. In the nosewheel well
  4. Behind the cockpit switch panel
- 2-14. The windshield wiper switch must be in which of the following positions before the rain repellent system will function?
1. Low
  2. Off
  3. Either 1 or 2 above
  4. High
- 2-15. Approximately how many applications of rain repellent fluid are available from a full container?
1. 10
  2. 30
  3. 60
  4. 100
- 2-16. The nitrogen pressure in a fully charged rain repellent container will read what psi?
1. 50 psi
  2. 75 psi
  3. 100 psi
  4. 150 psi

---

Learning Objective:  
*Identify operating principles, components, and maintenance procedures for fire-extinguishing utility systems.*

---

- 2-17. Aircraft fire-extinguishing utility systems are designed primarily to protect what aircraft components?
1. Heaters
  2. Engines
  3. Fuel systems
  4. Electronic equipment
- 2-18. The inspection and maintenance of aircraft fire-extinguishing systems is an important responsibility of the AME.
1. True
  2. False
- 2-19. CF<sub>3</sub>Br is a desirable fire-extinguishing agent for which of the following reasons?
1. It is noncorrosive and leaves no residue
  2. It is an electrical insulator
  3. It goes farther than CO<sub>2</sub>, and does not deteriorate
  4. Each of the above
- 2-20. The CF<sub>3</sub>Br agent discharged from the distributing assembly as a spray extinguishes an engine fire by what action?
1. It lowers the temperature to a point at which combustion will not take place
  2. It forces the fire away from the engine
  3. It vaporizes in the heat and smothers the fire by reducing the oxygen content of the area
  4. It acts in all of the above ways
- 2-21. What retains the nitrogen charge and CF<sub>3</sub>Br agent in the container?
1. A bonnet and a cartridge
  2. A bonnet and a frangible disc
  3. A frangible disc and a cartridge
  4. A frangible disc and a fusible plug



2-22. The fusible plug in the CF<sub>3</sub>Br system melts at temperatures within what range?

1. 100° to 120°F
2. 166° to 180°F
3. 208° to 220°F
4. 225° to 240°F

2-23. Which of the following statements concerning CF<sub>3</sub>Br fire extinguishing systems is false?

1. Some systems are equipped with a relief valve instead of a fusible plug
2. Some larger aircraft use more than one fire-extinguishing agent container to direct the agent to several points
3. Some system containers are equipped with two valve assemblies that provide a secondary means of discharging the agent from the container
4. Some systems are equipped with pneumatically operated valves as a secondary means of discharging the agent from the container

2-24. When performing a leakage test on a fire-extinguishing system, what should you use to pressurize the system?

1. CO<sub>2</sub>
2. CF<sub>3</sub>Br
3. Nitrogen
4. Compressed air

---

Learning Objective:  
*Recognize the purpose of the thermal radiation protection system.*

---

2-25. What type radiation shields are on the A-6 aircraft?

1. Fiber glass panels
2. Fabric curtains
3. Metal panels
4. Aluminized cloth

2-26. The sliding panels of the canopy radiation enclosures on the A-6 aircraft are moved to the open, half open, and closed positions by what means?

1. Manually only
2. Electrically only
3. Manually or electrically
4. Pneumatically

2-27. When the thermal closure switch is placed in the CLOSE position for manual operation of the A-7 radiation protection system, which of the following actions occurs first?

1. The seat position switch is actuated
2. The closure selector valve is energized
3. The ejection seat is lowered to within 1/4 inch of full down position
4. The extend lines to the closure actuators are vented

2-28. What component in the A-7 radiation system initiates the automatic mode of operation?

1. Nuclear flash sensor
2. Thermal closure switch
3. Closure selector valve
4. Switching, demodulator unit

2-29. When flying special weapons missions, the pilot's helmet is equipped with which of the following devices?

1. Polarized lens
2. ELF lens
3. Voice powered mike
4. Special insulated line

---

Learning Objective: *Identify the types of canopy systems and their purpose. Recognize the function, operation, and purpose of the components in the F-14 aircraft canopy system.*

---

2-30. The canopy of modern high-performance aircraft serves which of the following purposes?

1. Protection
2. Visibility
3. Avenue of escape
4. Each of the above

2-31. What are the two types of canopies commonly used on naval aircraft?

1. Hinged and actuating
2. Sliding and clamshell
3. Actuating and sliding
4. Split and clamshell

2-32. The F-14 canopy contains how many acrylic panels?

1. One
2. Two
3. Three
4. Four

ITEMS 2-33 THROUGH 2-41 PERTAIN TO THE F-14 AIRCRAFT CANOPY SYSTEM.

2-33. What is the indicator that the canopy is closed and locked?

1. The reference mark are aligned
2. The marker indicates closed
3. The pressure indicator goes to zero
4. The control handle indicates closed

2-34. How many control handles are there for opening and closing the F-14 canopy?

1. One
2. Two
3. Three
4. Four

REFER TO FIGURE 2-2 IN THE TEXT TO ANSWER ITEMS 2-35 THROUGH 2-41.

2-35. When the canopy control handle is positioned to OPEN, what component in the system prevents nitrogen pressure from escaping from the No. 6 valve through the overboard vent?

1. The number 1 valve
2. The number 2 valve
3. A solenoid valve
4. A check valve

2-36. When the canopy control handle is in position to OPEN, nitrogen pressure is routed through what valves?

1. Number 1 valve to the unlock part of the canopy-lock pneumatic actuator
2. Number 2 and 6 valves to the unlock part of the canopy-lock pneumatic actuator
3. Number 1 and 6 valves to the unlock part of the canopy-lock pneumatic actuator
4. Number 1 and 2 valves to the unlock part of the canopy-lock pneumatic actuator

2-37. When the canopy handle is pulled to the open position, the number 1, 2, and 6 valves are positioned by which of the following methods?

1. 2 and 2 electrically, 6 pneumatically
2. 1 and 2 mechanically, 6 pneumatically
3. 1 and 2 pneumatically, 6 mechanically
4. 1 and 2 hydraulically, 6 electrically

2-38. What operating nitrogen pressure is used to open the canopy?

1. 115 psi
2. 195 psi
3. 245 psi
4. 325 psi

2-39. What component(s) within the canopy hydraulic actuator converts nitrogen pressure to hydraulic pressure for operating the actuator?

1. Open transfer cylinder
2. Close transfer cylinder
3. Flow regulator and bypass valve
4. Open and close transfer cylinders

2-40. Nitrogen pressure passing through the timer check valve is used to operate the canopy actuator to the open position. Which of the following components makes the nitrogen available at the timer check valve?

1. Shuttle valve
2. Number 1 valve
3. Open transfer cylinder
4. Canopy pneumatic timer

- 2-41. When the canopy hydraulic actuator opens the canopy, the displaced hydraulic fluid on the close side of the actuator returns to what device?
1. Number 4 valve in the control module
  2. Open side of the canopy hydraulic actuator
  3. Close transfer cylinder
  4. Overboard vent through the C2 port
- 2-42. What canopy control handle position stops the canopy motion in any desired positions?
1. Hold
  2. Normal close
  3. Normal open
  4. Stop
- 2-43. Which of the following forces normally classes the canopy?
1. Pneumatic power
  2. Canopy weight
  3. Electrical power
  4. Each of the above
- 2-44. (Refer to figure 2-2 in the text.) When the canopy is closing, what happens to the nitrogen in the open transfer cylinder that is displaced by the hydraulic fluid from the open side of the hydraulic actuator?
1. It is returned to the auxiliary pneumatic reservoir
  2. It is returned to the canopy pneumatic reservoir
  4. It is vented overboard through the number 1 valve in the control module
  4. It is vented overboard through the number 3 valve in the control module
- 2-45. When the canopy caution lights on the advisory panels go out, this indicates the canopy is in which of the following positions?
1. Full down
  2. Full forward
  3. Locked
  4. Full up and locked position
- 2-46. The boost closing mode is used to close the canopy under what of the following circumstances?
1. When the wind prevents normal closing
  2. When AFC 95 has been installed
  3. When valve NO. 4 is inoperative
  4. When nitrogen pressure is low
- 2-47. (Refer to figure 2-2 in the text.) The pressure for boosted closing of the canopy comes from which of the following components?
1. The 790 psi pressure reducer
  2. The 1250 psi relief valve
  3. The 325 psi pressure reducer
  4. The reservoir relief valve
- 2-48. Under which of the following circumstances should the auxiliary opening made be used?
1. When the port fails to open
  2. When the control handle will not move
  3. When nitrogen pressure drops below 225 psi
  4. When not modified by AFC 95
- 2-49. What is the purpose of the auxiliary pneumatic reservoir?
1. To operate the canopy hydraulic cylinder when normal reservoir pressure is low
  2. To open the emergency cylinder when normal reservoir pressure is low
  3. To supply boosted pressure to the system when normal reservoir pressure is low
  4. To unlock the canopy when normal reservoir pressure is low

(REFER TO FIGURE 2-2 IN THE TEXT TO ANSWER ITEMS 2-50 THROUGH 2-54.) IN ITEMS 2-50 THROUGH 2-54, SELECT FROM COLUMN B THE COMPONENT IN THE CANOPY SYSTEM THAT PERFORMS THE FUNCTION(S) LISTED IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
2-50.	Operates on nitrogen pressure received from the canopy pneumatic control on the module canopy pneumatic timer	1. Flow regulators 2. Timer check valve 3. canopy-lock pneumatic actuator 4. Canopy pneumatic timer
2-51.	Vents pneumatic pressure from the canopy hydraulic actuator to the canopy pneumatic control module for canopy closing	
2-52.	Vents/pressurizes the canopy hydraulic actuator shutoff valves	
2-53.	Controls the operational speed of the canopy hydraulic actuator	
2-54.	Moves the canopy forward to the locked position or aft to the unlocked position	
2-55.	{Refer to figure 2-2 in the text.) What valve prevents the canopy pneumatic reservoir from going to zero pressure when a leak develops in the system's servicing charging module?	
	1. Restrictor 2. Relief 3. Shutoff 4. Check	
2-56.	(Refer to figure 2-2 in the text.) When auxiliary mode is selected to unlock the canopy, nitrogen is directed to the unlocking side of the canopy-lock pneumatic actuator at what pressure?	
	1. 225 psi 2. 325 psi 3. 3,000 psi 4. 4,100 psi	

IN ITEMS 2-57 THROUGH 2-61, SELECT FROM COLUMN B THE COMPONENT IN THE CANOPY SYSTEM THAT PERFORMS THE FUNCTION(S) LISTED IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
2-57.	Allows normal pneumatic pressure or auxiliary pneumatic pressure to enter the canopy lock pneumatic actuator	1. Low pressure Sensor 2. 325 psi pressure reducer 3. Shuttle Valve
2-58.	Causes the module valves to lock pressure in the canopy hydraulic actuator for canopy counter-balance	4. Auxiliary Unlock pneumatic release valve
2-59.	Permits auxiliary pneumatic reservoir pressure to be applied to the shuttle valve	
2-60.	Provides the normal operating pneumatic pressure for the system	
2-61.	Operates the No. 5 and No. 6 valves in the pneumatic control module	
2-62.	Which of the following valves will prevent over-pressurization of the canopy pneumatic system?	
	1. Reservoir relief 2. 1250 psi relief 3. 500 psi relief 4. Restrictor	

- 2-63. Concerning servicing a canopy system's normal and auxiliary reservoirs to maximum pressure and capacity, which of the following statements is correct?
1. The auxiliary reservoir has a larger capacity and lower pressure than the canopy reservoir
  2. The auxiliary reservoir has a higher pressure and lower capacity than the canopy reservoir
  3. The auxiliary reservoir has a smaller capacity but the same pressure as the canopy reservoir
  4. The auxiliary reservoirs capacity and pressure are the same as the canopy reservoirs'
- 2-64. After the auxiliary unlocking made has been used to open the canopy, which of the following actions must be accomplished to return the system to normal?
1. Auxiliary pneumatic reservoir must be reserviced
  2. The unlock shuttle valve must be manually reset
  3. The canopy-lock pneumatic actuation must be repositioned
  4. The auxiliary unlock pneumatic release valve cam must be manually reset
- 2-65. The position of the unlock shuttle in the canopy system is controlled by what action or device(s)?
1. Pneumatic pressure
  2. Mechanical linkage from the canopy central handle
  3. A cable and pulley assembly and an electric cam
  4. Mechanical linkage from the canopy-lock pneumatic actuator
- 2-66. When ejection is initiated, the upward movement of the canopy by the hydraulic actuator is accomplished by what means?
1. Hydraulic pressure and mechanical linkages
  2. Pneumatic pressure and mechanical linkages
  3. High-pressure gas
  4. Mechanical linkages only
- 2-67. (Refer to figure 2-4/2-5 in the text.) What is the total number of emergency canopy initiator handles in the system?
1. Six
  2. Two
  3. Three
  4. Four
- 2-68. The backup initiator is located on what part of the canopy area?
1. The back of the forward ejection seat
  2. The canopy actuator
  3. The cockpit turtle deck
  4. The safe-and-arm module

# Assignment 3

Textbook Assignment: "Canopy System"; "Pressurization and Air-conditioning Systems." 2-8 through 3-2.

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Learning Objective:  
*Recognize the operation, emergency jettison procedures, and components of the sliding canopy system.*

---

3-1. What type of canopy is used on the A-6A aircraft, and which of the following methods is normally used to open and close it?

1. Clamshell, manual
2. Sliding, electrical
3. Sliding, hydraulic
4. Clamshell, pneumatic

3-2. When the canopy will not open by its normal system, it can be opened by what other method?

1. Pneurnatically with the emergency switch
2. Electrically with the emergency switch
3. Mechanically through linkages
4. Hydraulically with the hand pump system

3-3. When the canopy is emergency jettisoned, what method is used to fire the jettison cartridge?

1. Electrical
2. Pneumatic
3. Hydraulic
4. Manual

3-4. From how many positions on the aircraft can the canopy jettison cartridge be fired?

1. One
2. Two
3. Three
4. Four

3-5. (Refer to figure 2-7 in the text.) What valve prevents air battle pressure from escaping overboard if a leak develops in the air filler valve?

1. Check
2. Relief
3. Air release
4. Vent bleeder check

3-6. Should leakage occur in any one of the air release valves, what prevents inadvertent firing of the jettison cartridge?

1. The check valve
2. The relief valve
3. The flow regulator
4. The vent bleeder valve

3-7. What is the purpose of the manual override feature on the vent bleeder valve in the jettison system?

1. To bleed off pressure after testing the system
2. To bleed off excessive, pressure that builds up after servicing the system
3. To bleed off excessive pressure that builds up from thermal expansion in the system
4. To vent excess pressure overboard during servicing of the svstem

---

Learning Objective:  
*Recognize the purpose and operation of the canopy seal system.*

---

3-8. A canopy seal system provides an airtight seal between the canopy assembly and the aircraft structure to maintain cockpit pressurization.

1. True
2. False

- 3-9. The canopy seal regulator performs which of the following functions?
1. Provides 80 psi pressure in the canopy seal when the canopy is unlocked
  2. Provides 80 psi pressure in the canopy seal when the canopy is locked
  3. Provides 25 to 30 psi above ambient when the canopy is unlocked
  4. Provides 25±5 psi pressure above ambient when the canopy is closed and locked
- 3-10. The venting of pressure through the relief/vent port of the canopy seal regulator will occur when which of the following events happen?
1. When the service air heat exchanger has supplied approximately 80 psi pressure to the canopy seal regulator
  2. When the service air heat exchanger has supplied approximately 25 to 30 psi pressure to the canopy seal regulator
  3. When the canopy is unlocked
  4. When the pressure downstream of the regulator is between 6 to 8 psi
- 3-11. What valve in the electrically actuated canopy seal prevents pressure from becoming excessive during rapid altitude changes?
1. Dump
  2. Relief
  3. Outflow
  4. Shutoff
- 3-12. Electrical failure of the canopy seal system will cause which of the following actions to occur?
1. The relief valve will close
  2. The dump switch solenoid will energize
  3. The solenoid valve will energize
  4. The regulator valve will dump
- 3-13. (Refer to table 2-1 in the text.) During a ground test on an electrically actuated canopy seal system you find that the seal will not inflate. If you determine that all controls pertinent to the proper operation of the seal have been activated, which of the following conditions could cause the trouble?
1. A ruptured seal
  2. A defective canopy seal regulator or check valve
  3. A defective power supply circuit to the seal regulator
  4. Each of the above
- 
- Learning Objective:  
*Recognize the purpose and operation of a frangible escape system.*
- 
- 3-14. A frangible escape system is used to jettison the canopy on the S-3A aircraft?
1. True
  2. False
- 3-15. The S-3A canopy glass is removed during ejection by what device(s)?
1. Glass cutters
  2. Glass crushers
  3. Breaker plates
  4. Both 2 and 3 above
- 3-16. What is the approximate length of the external jettison initiator cable on the S3 aircraft?
1. 6 feet
  2. 8 feet
  3. 10 feet
  4. 12 feet
- 3-17. Which of the following parts will be blown away from the aircraft when either of the external handles is pulled?
1. Hatches
  2. Fillets
  3. Supports
  4. All of the above

3-18. What total number of internal initiators are in the canopy and hatch jettison system?

1. Five
2. Two
3. Three
4. Four

3-19. What device prevents the internal jettison handle from being squeezed and pulled?

1. Shear pin
2. Safety pin
3. Shear wire
4. Safety guard

3-20. What is the total number of SMDC initiator handles in the S-3A aircraft?

1. Five
2. Six
3. Three
4. Four

3-21. Which, if any, of the following actions will initiate the SMDC when safety pins are installed?

1. Drilling
2. Filing
3. Hammering
4. None

Learning Objective:

*Recognize the service life and expiration dates of cartridges and cartridge-activated devices (CAD).*

IN ANSWERING QUESTIONS 3-22 THROUGH 3-25, SELECT THE PUBLICATION NAME FROM FIGURE 3-1 ABOVE, WHICH RELATES TO THE PUBLICATION NUMBER USED AS THE QUESTION.

3-22. NAVAIR 11-85-1.

1. A
2. B
3. C
4. D

3-23. OP 4.

1. A
2. B
3. C
4. D

3-24. OP 5

1. A
2. B
3. C
4. D

3-25. NAVAIR 11-100-1.

1. A
2. B
3. C
4. D

3-26. The specific period of time that a CAD is allowed to be used is called its

1. shelf life
2. service life
4. installed life
5. removed life

3-27. What date must be checked prior to installing a CAD into any system?

1. Open
2. Service life expiration
3. Installed
4. Manufacture

3-28. To determine the service-life expiration date of a CAD, what date(s) must be computed?

1. Aircraft life
2. Shelf life
3. Installed life
4. Both 2 and 3 above

- |     |  |
|-----|--|
| (A) | Description, Preparation For Use, and Handling Instructions, Aircrew Escape Propulsion System (AEFS) Devices |
| (B) | General Use Cartridges and Cartridge-Actuated Devices for Aircraft and Associated Equipment                  |
| (C) | Ammunition Afloat  |
| (D) | Ammunition and Explosives Ashore   |

Figure 3-1



- 3-29. If the date of manufacture of a CAD is 0981 and the shelf life is 6 years, what is its shelf life expiration date?
1. 0985
  2. 0986
  3. 0987
  4. 0988
- 3-30. To which of the following manuals should you refer to determine the installed-life expiration date of a CAD?
1. NAVAIR 11-100-1
  2. NAVAIR 11-85-1
  3. OP 4
  4. OP 5
- 3-31. To determine the installed-life expiration date, the installed-life date is added to the date the container was subjected to what action?
1. Opened
  2. Received from supply
  3. Received from the manufacturer
  4. Sealed by the manufacturer
- 3-32. If the installed life is 66 month, what is the installed-life expiration date of a CAD whose container was opened during 1183?
1. 0588
  2. 0688
  3. 0589
  4. 0689
- 3-33. After the shelf life and installed life dates have been computer, the earlier date will be used for CAD service-life expiration date.
1. True
  2. False
- 3-34. A hermetically sealed container was opened on 15 March. Which of the following dates is used to compute the expiration date?
1. 1 January
  2. 1 March
  3. 15 March
  4. 31 March
- 3-35. Scribing is an approved method for marking expiration dates on CADs
1. True
  2. False
- 3-36. Which of the following dates must be marked on a CAD that is being installed in an aircraft?
1. Installed
  2. Shelf life
  3. Container opened
  4. Installed life
- 3-37. A logbook entry for a CAD must be made-when which of the following events occurs?
1. Actuation
  2. Replacement
  3. Reinstallation
  4. Refurbishment
- 3-38. A contingency service-life extension for a CAD granted by the commanding officer may not exceed what maximum number of days?
1. 15
  2. 30
  3. 45
  4. 60
- 3-39. An additional service-life extension beyond the contingency extension may be requested by message from which of the following activities?
1. NAVORDSTA
  2. NAVAIRLANT
  3. NAVAIRSYSCOM
  4. NAVORDSYSCOM
- 3-40. A change to NAVAIR 11-100-1 may change the permanent service life of CADs. Which of the following methods is used to change NAVAIR 11-100-1.
1. Rapid action change
  2. Interim rapid action change
  3. Formal change
  4. Each of the above

Learning Objective:  
*Identify CAD Maintenance policy to include SMDC and FCDC maintenance and inspection requirements and safety precautions.*

- 3-41. The service life of wire-braid, Teflon®-hoses is the same as the service life of what associated item?
1. The initiator to which it is attached
  2. The aircraft in which it is installed
  3. The CAD to which it leads
  4. The rocket motor to which it leads
- 3-42. Hoses in an escape system should be inspected how often?
1. At every phased inspection
  2. Upon removal of the seat
  3. After the bases are disconnected
  4. Each of the above
- 3-43. For safety reasons, which of the following devices will be installed in CADs when CADs are removed from an aircraft?
1. Caps
  2. Plugs
  3. Safety pins
  4. Each of the above

<p>A. 0.10 inch B. 0.25 inch C. 0.75 inch D. 1.00 inch</p>
--

Figure 3-2

IN ANSWERING QUESTIONS 3-44 THROUGH 3-48, SELECT THE CLEARANCE FROM FIGURE 3-2 ABOVE, WHICH SHOULD BE USED FOR THE STRUCTURAL DESCRIPTION PROVIDED IN THE QUESTION. CLEARANCES USED IN FIGURE 3-22 MAY BE USED MORE THAN ONCE.

- 3-44. A supported section of SMDC and the adjacent structure.
1. A
  2. B
  3. C
  4. D
- 3-45. Straight unsupported sections of SMDC and the adjacent structure.
1. A
  2. B
  3. C
  4. D
- 3-46. Two parallel SMDCs.
1. A
  2. B
  3. C
  4. D
- 3-47. Unsupported sections of SMDC and any operating mechanism.
1. A
  2. B
  3. C
  4. D
- 3-48. A supported section of SMDC and an electrical wire bundle.
1. A
  2. B
  3. C
  4. D
- 3-49. When using the detonating card inspection gauge set to check the booster tip, what action, if any, should you take if the bar does not touch both sides of the gauge?
1. Replace the tip
  2. File the tip
  3. Replace the booster
  4. None
- 3-50. When using one CAD from a two-CAD set, what information should you mark on the unused CAD?
1. Shelf life
  2. Expiration date
  3. Container open date
  4. Both 2 and 3 above

3-51. Which of the following actions causes CADs to stick?

1. Overtorquing during installation
2. Using incorrect tools
3. Using incorrect lubricants
4. Each of the above

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Learning Objective:  
Identify the reason for the ordnance certification program.

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3-52. What manual provides the guidelines for an ordnance certification program?

1. OPNAVINST 8023.2
2. OPNAVINST 8024.2
3. OPNAVINST 8324.3
4. OPNAVINST 8024.9

3-53. All personnel handling live ammunition must be qualified and certified in accordance with OPNAVINST 8023.2?

1. True
2. False

3-54. All ordnance certified personnel must be frequently instructed in which of the following areas?

1. Safety precautions
2. Methods of handling
3. Storage and uses of the ammunition or explosives
4. Each of the above

3-55. New or inexperienced personnel must be under the direct and constant supervision of skilled, experienced, and certified personnel.

1. True
2. False

3-56. Personnel who supervise or perform work in connection with handling, inspection, installation, and care of cartridges must observe which of the following restrictions?

1. Ensure that all applicable regulations are rigidly observed
2. Carefully supervise the activities of all subordinate personnel
3. Inform all personnel of the constant need for using the utmost vigilance in the performance of their work
4. Each of the above

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Learning Objective:  
*Recognize the affect high altitude flight could have on flight personnel because of decreased atmospheric pressure.*

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2-57. Without the use of pressurized aircraft cabins, crew members would not get enough oxygen at higher altitudes. Which of the following factors is responsible for this?

1. As altitude increases the content of inert gases in the air increases, therefore, less oxygen is taken into the body during the breathing process
2. As altitude increases oxygen content increases along with atmospheric pressure, but not in proportion; therefore, less oxygen is taken into the body during the breathing process
3. As altitude increases, atmospheric pressure and oxygen content of the air decreases, resulting in less oxygen being taken into the body during the breathing process
4. As altitude increases air density increases resulting in less oxygen being taken into the body during the breathing process

3-58. The lowest outside air temperature encountered by an aircraft will occur at a altitude of about

1. 1 mile
2. 5 miles
3. 3 miles
4. 7 miles

3-59. Various sections of an aircraft are pressurized for which of the following reasons?

1. To provide for the proper operation of all aircraft electrical components
2. To provide for the proper operation of specific aircraft components only
3. To provide for the survival of personnel in a high altitude environment only
4. To provide for personnel survival at high altitudes and the proper operation of specific aircraft components

3-60. In addition to aerodynamic heating, other factors affecting cabin/cockpit temperatures are engine heat, solar heat, heat from electrical units, and heat from the body.

1. True
3. False

3-61. What is the maximum temperature a person can withstand for extended periods while still maintaining efficiency?

1. 85°F
2. 80°F
3. 75°F
4. 70°F

# Assignment 4

Textbook Assignment: "Pressurization and Air-Conditioning Systems." Pages 3-2 through 3-16.

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Learning Objective:

*Recognize the need for environmental control systems.*

- 4-1. Which of the following factors is of primary importance to the manufacture of pressurized aircraft cabins?
1. The cabin area must be large enough to accommodate the pressurized components
  2. The cabin area must be limited in size in order to adequately pressurize it
  3. The cabin must be designed to withstand the necessary pressure differential
  4. All pressurizing components must be strategically located for ease of maintenance
- 4-2. Which of the following components protects the cabin from excessive pressures?
1. Cabin pressure valve
  2. Cabin safety valve
  3. Cabin pressure regulator
  4. Cabin air check valve
- 4-3. On jet aircraft, air for pressurizing the cabin is supplied by which of the following engine sections?
1. Air inlet
  2. Accessory
  3. Turbine
  4. Compressor
- 4-4. Which of the following statements best explains the method for controlling cabin pressure?
1. A bleed valve is installed in the cabin air line
  2. A regulator is installed to limit the air exiting the cabin
  3. A regulator is installed to limit the air entering the cabin
  4. A controlled orifice is installed in the cabin inlet air line
- 4-5. Which of the following aircraft systems are classified as environmental systems?
1. Deicing, defogging, rain removal, and pressurization systems
  2. Anti-icing, air-conditioning equipment cooling, and windshield washing systems
  3. Deicing, anti-icing, air-conditioning, and defogging systems
  4. Defogging, rain removal, pressurization, and air-conditioning systems
- ITEMS 4-6 THROUGH 4-15 PERTAIN TO THE SYSTEM USED ON THE F-18 AIRCRAFT.
- 4-6. When the environmental system on the aircraft is in operation with one engine shut down, what component prevents bleed air from the operating engine from being lost when the engine is shut down?
1. Air pressure regulation valve
  2. Engine bleed-air check valve
  3. Reverse flow valve
  4. Spring-loaded shutoff valve

- 4-7. What is the purpose of the two overpressure switches in the bleed-air system?
1. To protect the system components from damage due to excessive pressure
  2. To prevent excessive pressure buildup in the engine compressor section
  3. To maintain the desired pressure in the cabin during cabin pressurization
  4. To vent pressure overboard when excessive pressure exists in the air-conditioning system
- 4-8. When electrical failure occurs in an operating air-conditioning system, what action is taken by the spring-loaded engine bleed-air pressure regulation valve?
1. It remains in the position it was in at the time of electrical failure
  2. It is powered to the open position by the spring tension
  3. It is powered to the closed position by spring tension
  4. It requires manual operation to the desired position
- 4-9. What component) in the bleed-air system maintain bleed-air pressure from the engines within 75±15 psi?
1. Engine bleed check valves
  2. Primary bleed-air overpressure switch
  3. Engine bleed-air pressure regulation and shutoff valves
  4. Engine bleed-air secondary pressure regulating and shutoff valves
- 4-10. In the event bleed-air pressure becomes higher than normal due to a malfunction, what component in the system will take over and regulate air pressure?
1. Engine bleed-air secondary pressure regulating and shutoff valve
  2. Engine bleed check valve
  3. Primary bleed-air overpressure switch
  4. Secondary bleed-air overpressure switch
- 4-11. Which of the following statements is correct regarding the purpose/function of the primary bleed-air overpressure switch?
1. The switch will activate at 250 psi maintaining the system at that pressure when normal regulation fails
  2. Activation of the switch will give maintenance personnel data for determining malfunctions in the bleed-air system
  3. The switch will activate a digital display indicator on the instrument panel warning the pilot of a bleed-air system failure
  4. Activation of the switch will close three pressure regulator shutoff valves, shutting down the bleed-air system
- 4-12. Which of the following circumstances will cause the secondary bleed-air overpressure switch to activate?
1. Right engine bleed-air pressure-regulator and shutoff valve failure only
  2. Left engine bleed-air pressure regulator and shutoff valve failure only
  3. Failure of both right, and left engine bleed-air pressure regulation and shutoff valves
  4. Bleed-air pressure downstream of the secondary bleed-air regulator exceeds 150±10 psi
- 4-13. What valve(s) in the bleed-air system provide(s) bleed air from the operating engine to start the second engine?
1. Engine bleed-air check valve
  2. Air isolation valve
  3. Engine bleed-air secondary pressure valve
  4. Engine bleed-air pressure valve

4-14. Aircraft APU air can be used to augment engine bleed air for operating the aircraft air-conditioning system. What valve(s) in the bleed-air system provide(s) air for this feature?

1. Air isolation valve
2. Engine bleed-air check valve
3. Engine bleed-air secondary pressure valve
4. Engine bleed-air pressure valves

4-15. What is the function of the control unit in the bleed-air " leak detection system?

1. To close the bleed-air pressure regulator when an overheat condition occurs in the system only
2. To operate a warning light on the advisory panel when an overheat condition occurs in the system only
3. To close the bleed-air pressure regulator and light a warning light on the advisory panel when overheat occurs in the system
4. To provide a means for selecting a nonleaking system for backup

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Learning Objective:  
*Recognize the operating principles and components of the air cycle air-conditioning system.*

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4-16. Air cycle air-conditioning systems are used in most naval aircraft for which of the following reasons?

1. The overall costs for installation and operation of air cycle systems are lower
2. Refrigerant systems do not function well at high altitudes
3. Refrigerant systems are more difficult to maintain
4. Air cycle systems are efficient for their weight and the space required and are relatively trouble free

ITEMS 4-17 THROUGH 4-54 PERTAIN TO THE AIR-CONDITIONING SYSTEM IN THE F-18 AIRCRAFT.

4-17. What is the source of the cooling air used to cool bleed air in the primary and secondary heat exchangers?

1. RAM air/outside air flowing across the heat exchangers
2. AFU air being ejected across the heat exchangers
3. Bleed air modulated by a system pressure regulator valve ejected across the heat exchanger
4. Bleed air forced through the heat exchanger by the turbine compressor

4-18. What is the purpose of the secondary heat exchanger?

1. To cool the bleed air after it leaves the engine compressor section
2. To cool the bleed air before it is ejected into the primary heat exchanger
3. To cool the bleed air coming from the compressor end of the refrigeration turbine/compressor
4. To increase the temperature of the bleed air before it enters the refrigeration turbine/compressor

4-19. What system component cools bleed air by the rapid expansion method?

1. Refrigeration compressor
2. Primary heat exchanger
3. Secondary heat exchanger
4. Refrigeration turbine

IN ITEMS 4-20 THROUGH 4-26, SELECT FROM COLUMN B THE COMPONENT THAT IS RESPONSIBLE FOR THE FUNCTION LISTED IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
4-20.	Cools hot engine bleed air	1. Primary ejector valve
4-21.	Cools air on the same principle that a car radiator cools water	2. Primary heat exchanger
4-22.	Controls flow of bleed air to primary heat exchanger ejectors	3. Avionics RAM air servo
4-23.	Uses the electrical signals from the avionics temperature flow sensor	4. Flow modulating system pressure regulator valve
4-24.	Protects the refrigeration turbine from heat damage during overtemperature conditions	
4-25.	Monitors the differential pressure of the bleeder air up and downstream of the flow modulating system pressure regulator valve	
4-26.	Ensures that a sufficient amount of cooling air goes to the avionics systems	

4-27. When an overtemperature exists in the turbine or compressor section of the refrigeration turbine/compressor assembly, the protective temperature sensors will cause which of the following conditions to occur?

1. The sensor sensing the overtemperature will close the flow modulating system pressure regulator and cause turbine speed to decrease
2. The sensor sensing the overtemperature will close the engine bleed-air pressure regulation and shutoff valve on the engine producing the overtemperature
3. The sensor sensing the overtemperature will close the engine bleed-air check valve on the engine producing the overtemperature
4. The compressor temperature sensor closes the flow modulating system pressure regulator and the turbine temperature sensor closes the affected engine bleed-air check-valve



IN ITEMS 4-28 THROUGH 4-33, SELECT FROM COLUMN B THE COMPONENT THAT IS RESPONSIBLE FOR THE FUNCTION LISTED IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
4-28.	Receives the air from the compressor section of the refrigeration turbine/compressor assembly	1. Secondary ejector valve 2. Secondary heat exchanger 3. Reheater heat exchanger 4. Water spray nozzle
4-29.	Controlled by an electrical signal from the air data computer	
4-30.	Controls the flow of bleed air to the secondary heat exchanger ejector	
4-31.	Aids in cooling the inlet air entering the secondary heat exchange	
4-32.	Uses the water that is extracted from the conditioned air	
4-33.	Cools air before moisture removal and heats air after moisture removal	

REFER TO FIGURE 4-2 AND SUPPORTING MATERIAL IN THE TEXT TO ANSWER ITEMS 4-34 THROUGH 4-33.

4-34.	The air used for cooling in the condenser/vent suit heat exchanger comes directly from which of the following components?
	1. The reheater heat exchanger 2. The secondary heat exchanger 3. The water extractor 4. The turbine/compressor assembly

- 4-35. The air to be cooled in the condenser/vent suit heat exchanger comes directly from which of the following component?
1. The turbine/compressor assembly
  2. The hot side of the reheater
  3. The secondary heat exchanger
  4. The primary heat exchanger
- 4-36. The purpose of the water extractor to extract water from the air coming directly from which of the following components?
1. The reheater heat exchanger
  2. The secondary heat exchanger
  3. The condenser/vent suit heat exchanger
  4. The turbine compressor assembly
- 4-37. The water removed by the water extractor is used for which of the following purposes?
1. Suit ventilation
  2. Augment ram air cooling in the secondary heat exchanger
  3. Supply ram air to the secondary heat exchanger
  4. Supply dry air to the reheater heat exchanger
- 4-38. Air exiting the turbine end of the turbine compressor assembly is used for which of the following purposes?
1. To operate the flow modulating system pressure regulator
  2. To provide air to the secondary heat exchanger
  3. To provide air for environmental control
  4. To provide air to the avionics ram air servo
- 4-39. What component prevents icing in the condenser/vent suit heat exchanger?
1. Turbine compressor assembly
  2. Anti-ice add heat valve
  3. Avionics ram air servo
  4. Reheater heat exchanger

ITEMS 4-40 THROUGH 4-45 PERTAIN TO  
COMMON AIR-CONDITIONING COMPONENTS.

4-40. Which of the following components is used in bleed air ducting to compensate for duct expansion due to high temperatures?

1. Flexible line connectors
2. Marmon clamps
3. Thermal compensators
4. Flexible mounting brackets

4-41. Which of the following statements is correct concerning the materials bleed air and air-conditioning distribution lines are made of?

1. Air-conditioning lines are made of stainless steel and bleed-air lines of aluminum alloy
2. Air-conditioning and bleed-air lines are both made of stainless steel
3. Bleed-air lines and air-conditioning lines are both made of aluminum alloy
4. Bleed-air lines are made of stainless steel and air-conditioning distribution lines of aluminum alloy

4-42. Excessive torquing of clamps used in bleed-air air-conditioning systems will cause which of the following results?

1. Structural loads on the ducting
2. Structural loads on support brackets
3. Structural loads on the clamping devices
4. Ruptures in the system ducting

4-43. When installing a base between two duct sections, what is the minimum and maximum distance allowed between the duct ends?

1. 1/8 inch minimum, 1/4 inch maximum
2. 1/8 inch minimum, 3/4 inch maximum
3. 1/4 inch minimum, 1/2 inch maximum
4. 1/4 inch minimum, 3/4 inch maximum

4-44. When installing a hose between two ducts, what is the maximum misalignment allowed between the two duct ends?

1. 1/8 inch
2. 1/4 inch
3. 3/8 inch
4. 1/2 inch

4-45. When installing rigid couplings on ducting, which of the following methods is used to assure proper alignment of the flanges in the couplings?

1. Tighten coupling until gap is completely closed, then back off 1/4 turn on the nut
2. Torque coupling to prescribed torque, tap around coupling with a plastic mallet and retorque to an additional 10 percent of prescribed torque
3. Tighten coupling firmly, tap around outer surface of coupling with a plastic mallet, then tighten coupling to prescribed torque valve
4. Torque coupling to torque valve, check clamp for proper position, then retorque to an additional 10 percent of original torque valve

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Learning Objective:  
*Recognize the components and functions of the cabin cooling and antifog system.*

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ITEMS 4-46 THROUGH 4-52 PERTAIN TO THE  
CABIN COOLING AND ANTIFOG SYSTEM ON THE  
F-18 AIRCRAFT.

4-46. When an increase in air temperature is desired in the cabin, air is routed through which of the following components?

1. Cabin/defog ram air control valve
2. Cabin add heat valve
3. Cabin flow valve
4. Anti-ice add heat valve

- 4-47. Distribution of conditioned air to the cabin can be divided between air used for the cabin and air used for defogging the windshield. This distribution is accomplished by what action?
1. Selecting the appropriate position on the suit/cabin temperature control valve
  2. Selecting the appropriate position on the air-conditioning system temperature/flow controller
  3. Selecting the appropriate position on the windshield defogging switch
  4. Selecting the appropriate position on the cabin defog plenum distribution valve with a control handle
- 4-48. Which of the following components provides the electrical signal that determines the position of the cabin add heat valve?
1. Cabin air overtemperature sensor
  2. Cabin airflow\temperature sensor
  3. Cabin/defog plenum distribution valve
  4. Suit/cabin temperature control
- 4-49. Which of the following actions explains how air pressure and spring tension operate the cabin add heat valve?
1. Venting air pressure from the valve allows the valve to close against spring tension
  2. Venting air pressure from the valve allows the valve to open under spring tension
  3. Regulated air pressure to the valve and spring tension aid in opening the valve
  4. Regulated air pressure to the valve overcomes spring tension opening the valve
- 4-50. When an overtemperature occurs in the cabin cooling system, the cabin air overtemperature sensor allows which of the following actions?
1. The cabin flow valve to open
  2. The cabin/defog plenum distribution valve to close
  3. The cabin add heat valve to close
  4. The cabin ram air check valve to open
- 4-51. What component(s) in the cabin cooling and antifog system provide(s) for the automatic operation of the cabin flow valve?
1. Cabin/defog ram air solenoid only
  2. Cabin/defog ram air solenoid and the cabin overtemperature sensor
  3. Cabin airflow/temperature sensor only
  4. Cabin airflow/temperature sensor and the air-conditioning system temperature/flow controller
- 4-52. Which of the following statements is correct regarding the automatic drain valve in the cabin cooling and antifog system?
1. It relieves excessive pressure
  2. It regulates pressure in the system
  3. It is open to drain moisture from the supply duct, it closes when pressure is applied
  4. It drains the system of moisture when the switch on the air-conditioning system temperature/flow controller is turned on, and it closes automatically when pressure is applied to the system

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Learning Objective:  
*Recognize the source for avionics cooling air and identify the components of the avionic cooling system and the function of each component.*

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ITEMS 4-53 THROUGH 4-62 PERTAIN TO THE F-18 AVIONICS COOLING SYSTEM.

- 4-53. The air taken from the aircraft air-conditioning system to cool avionic equipment is controlled by which of the following components?
1. ECM cooling air control valve only
  2. Avionics RAM air valve only
  3. ECM cooling air control valve and avionics ram air valve
  4. Avionics flow/temperature sensor and temperature/flow controller
- 4-54. A pressure differential of 1.5 psi between the avionics cooling system and the air cycle air-conditioning system is maintained by which of the following components?
1. Avionics flow/temperature sensor
  2. Avionics flow valve
  3. ECM cooling air control valve
  4. Avionics ram air valve
- 4-55. Air that comes through the avionics ram air valve to augment avionics cooling comes from which of the following sources?
1. Secondary heat exchanger ram air inlet
  2. Liquid cooling system
  3. Emergency ram air scoop
  4. Air cycle air-conditioning system
- 4-56. What component in the avionics cooling system operates the avionics ram air valve?
1. Avionics flow/temperature sensor
  2. Pressure switch and the secondary heat exchanger
  3. ECM cooling air central valve
  4. Avionics ram air servo
- 4-57. Which of the following components controls the amount of airflow that will be directed to the ECM equipment for cooling purposes?
1. Avionics ram air valve
  2. Emergency ram air scoop
  3. ECM cooling air control valve
  4. Avionics fan control pressure switch

- 4-58. What component controls the position of the ECM cooling air control valve?
1. ECM made switch
  2. ECM cooling air control valve switch
  3. Avionics fan control pressure switch
  4. Avionics airflow control valve switch
- 4-59. Under which of the following conditions does the aircraft's avionics ground cooling fan cool avionics equipment?
1. During ground operation only
  2. During ground operation and taxi only
  3. During takeoffs only
  4. During ground operation, taxi, takeoffs, and landings
- 4-60. (Refer to figure 3-11 and supporting material in the text.) What prevents cooling air in the avionics system from escaping through the ground cooling duct during flight?
1. Avionics ram air check valve
  2. Nose wheel well plenum check valve
  3. Avionics fan check valve
  4. Avionics airflow check valve
- 4-61. (Refer to figure 3-11 and supporting material in the text.) The avionics fan control pressure switch will operate the avionics ground cooling fan when which of the following conditions exist?
1. During low airspeed flight operation
  2. During all flight and ground operation
  3. When the avionics ram air valve fails
  4. When the air cycle air-conditioning system's pressure is below  $26 \pm 1$  psig

- 4-62. The emergency ram air scoop provides-ram air cooling for essential conditions. The air scoop is activated by which of the following components?
1. Air-conditioning system temperature/flow controller
  2. Avionics temperature/flow sensor
  3. FCS cool switch
  4. Ram air pressure control switch

# Assignment 5

Textbook Assignment: "Pressurization and Air-Conditioning Systems"; and  
"Oxygen Systems." Pages 3-17 through 4-3.

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Learning Objective: *Recognize the operating principle of a vapor cycle air conditioning system and identify system components and their functions.*

ITEMS 5-1 THROUGH 5-2 PERTAIN TO THE  
VAPOR CYCLE AIR-CONDITIONING SYSTEM USED  
ON THE E-2 AIRCRAFT.

5-1. In what system component is the pressure of the refrigerant increased to the point that its condensing temperature is above the temperature of the water or air used for condensing purposes?

1. Expansion valve
2. Evaporator
3. Compressor
4. Condenser

5-2. (Refer to figure 3-12 and supporting material in the text.) Which of the following is the flow sequence for refrigerant through the system?

1. Receiver → subcooler → expansion valve → evaporator → subcooler → compressor → condenser → receiver
2. Receiver → subcooler → evaporator → subcooler → expansion valve → compressor → condenser → receiver
3. Receiver → condenser → subcooler → compressor → evaporator → subcooler → expansion valve → receiver
4. Receiver → expansion valve → compressor → subcooler → condenser → evaporator → subcooler → receiver

5-3. The air delivered to the aircraft avionics compartment is controlled within which of the following temperature ranges?

1. 33° ±5°C
2. 38° ±5°C
3. 38° ±5°F
4. 43° ±5°F

5-4. What is the source of power for the compressor and the evaporator fan mounted on the evaporator assembly?

1. Ram air driven motor
2. Hydraulically driven motor
3. Electrically driven ac motor
4. Electrically driven dc motor

5-5. During ground operation with engines running and insufficient ram air across the condenser for cooling, what component allows engine bleed air to be used to increase airflow across the condenser?

1. Thermostatic expansion valve
2. Ram air scoop actuator
3. Ejector air shutoff valve
4. Condenser pressure transducer

5-6. With the equipment cooling switch set to ON, what valve is energized to direct hydraulic pressure to the compressor drive motor and evaporator assembly fan motor?

1. Service
2. Shutoff
3. Lower charge
4. Thermostatic expansion

- 5-7. From an operational standpoint, what happens to the compressor motor and evaporator fan motor when the aircraft is in flight with the landing gear down, either engine in autofeather position, and the equipment cooling switch in the ON position?
1. Compressor motor and fan motor will continue to operate
  2. Compressor motor and fan motor will stop operating
  3. Compressor motor will continue to operate and fan motor will stop operating
  4. Compressor motor will stop operating and the fan motor will continue to operate
- 5-8. The high-speed cutout switch will cause the equipment cooling caution light in the cockpit to come on if the refrigerant pressure exceeds what pressures?
1. 225  $\pm$ 10 psi
  2. 225  $\pm$ 5 psi
  3. 250  $\pm$ 10 psi
  4. 250  $\pm$ 5 psi
- 5-9. If the high-pressure cutout switch fails to function properly, at what pressure will the relief valve in the compressor discharge line open?
1. 323 psi
  2. 324 psi
  3. 325 psi
  4. 326 psi
- 5-10. What component of the condenser assembly provides a signal to control the position of the condenser flap to regulate pressure?
1. Actuator
  2. Expansion valve
  3. Pressure transducer
  4. High side controller
- 5-11. What component prevents surges in the refrigerant flow rate of the vapor cycle system?
1. Receiver
  2. Evaporator
  3. Check valve
  4. Thermostatic expansion valve
- 5-12. The refrigerant temperature in the vapor cycle system is maintained between 29.8° and 32.9°  $\pm$ 0.6°F. This will produce approximately what temperature in the equipment compartments?
1. 36°F
  2. 38°F
  3. 40°F
  4. 42°F
- 5-13. At what fan inlet temperature will the low temperature cutoff switch de-energize the compressor power relay?
1. 28°F
  2. 29°F
  3. 30°F
  4. 31°F

IN ITEMS 5-14 THROUGH 5-16, SELECT FROM COLUMN B THE FUNCTION OF EACH COMPONENT LISTED IN COLUMN A.

<u>A. Components</u>	<u>B. Functions</u>
5-14. Subcooler	1. Removes moisture and other contaminants that may be in the liquid Freon 12
5-15. Receiver	2. Ensures that the liquid Freon 12 will not vaporize prematurely after passage through the thermostatic expansion valve
5-16. Filter-drier	3. Aids in determining whether servicing of the refrigerant unit is required
	4. Ensures that the thermostatic expansion valve receives an adequate supply of liquid Freon 12 during peak load conditions

- 3-17. The flow of refrigerant to the outlet parts of the expansion valve is controlled by positioning a metering valve pin. The position of this pin is determined by what factor?
1. Superheat spring setting only
  2. Evaporator discharge pressure only
  3. Pressure created by the remote sensing bulb only
  4. The pressure created by the remote sensing bulb, superheat spring setting, and evaporator discharge pressure

- 5-18. What part of the expansion valve is designed to ensure that the Freon 12 is in a gaseous state when it returns to the compressor?

1. The metering valve
2. The superheat spring
3. The inlet port
4. The equalizer port

- 5-19. An overcenter device installed in the evaporator header duct assembly--opens the louvers automatically and supplies cooling air to the avionics gear when which of the following conditions exist?

1. When the aircraft is on the ground and equipment cooling is required
2. When the aircraft is airborne and equipment cooling is required
3. When the aircraft is on the ground and a ground cooling cart is plugged into the aircraft for equipment cooling
4. When the aircraft is on the ground and equipment cooling is being changed from ground cart to aircraft cooling system

- 5-20. In which of the following system components does Freon 12 changes state occur?

1. The compressor and the receiver
2. The condenser and the compressor
3. The evaporator and the condenser
4. The receiver and the evaporator



5-21.	The compressor operates in accordance with which of the following principles?	IN ITEMS 5-25 AND 5-26, SELECT FROM COLUMN B THE COMPONENT USED FOR THE FUNCTION GIVEN IN COLUMN A.	
	<ol style="list-style-type: none"> <li>1. The pressure and temperature of a given volume of confined gas will increase if its volume increases</li> <li>2. If a given volume of gas is trapped and the area in which it is contained gradually decreases, the pressure and temperature will increase</li> <li>3. The pressure of a given volume of confined gas will increase and its temperature will decrease if its volume decreases</li> <li>4. The pressure of a given volume of confined gas will decrease and its temperature will increase if its volume decreases</li> </ol>	<u>A. Functions</u>	<u>B. Components</u>
		5-25. To facilitate individual group servicing or servicing the system as one complete unit	<ol style="list-style-type: none"> <li>1. Condenser ejector shutoff valve</li> <li>2. Purge valve</li> </ol>
		5-26. To bleed the system and to attach test equipment or the vacuum pump	<ol style="list-style-type: none"> <li>3. Charging valves</li> </ol>
		<hr/> Learning Objective: <i>Recognize vapor cycle charging cart heater tank capacity and the oil charging cylinder's temperature/pressure relation.</i> <hr/>	
5-22.	The highest temperature and pressure of the refrigeration cycle begins at what device or location?		
	<ol style="list-style-type: none"> <li>1. Receiver</li> <li>2. Condenser</li> <li>3. Discharge side of the compressor</li> <li>4. Discharge side of the thermostatic expansion valve</li> </ol>	5-27. What is the capacity of the Freon storage bottle in the vapor cycle charging cart shown in fig. 3-18 in the text?	<ol style="list-style-type: none"> <li>1. 20 pounds</li> <li>2. 25 pounds</li> <li>3. 20 gallons</li> <li>4. 25 gallons</li> </ol>
5-23.	When the system is shut down, what prevents high-pressure discharge from the compressor from motorizing the compressor in reverse?	5-28. The vacuum pump has a displacement of 3 cubic feet per minute (cfm) and is rated for continuous duty.	<ol style="list-style-type: none"> <li>1. True</li> <li>2. False</li> </ol>
	<ol style="list-style-type: none"> <li>1. The check valve</li> <li>2. The relief valve</li> <li>3. The charge valve</li> <li>4. The high-pressure cutout switch</li> </ol>	5-29. What is the capacity in cubic inches of the heater tank on the vapor cycle charging cart?	<ol style="list-style-type: none"> <li>1. 280 cubic in</li> <li>2. 299 cubic in</li> <li>3. 330 cubic in</li> <li>4. 360 cubic in</li> </ol>
5-24.	At what differential pressure range across the filter will the bypass device open and permit unfiltered oil to circulate through the compressor?		
	<ol style="list-style-type: none"> <li>1. 13.5 to 16.5 psi</li> <li>2. 16.5 to 18.5 psi</li> <li>3. 16 to 20 psi</li> <li>4. 18 to 22 psi</li> </ol>		

5-30. The oil charging cylinder of the vapor charging cart has a capacity of 68 cubic inches and an operating pressure of 100 psi at which of the following temperatures?

1. 120°F
2. 125°F
3. 130°F
4. 135°F

5-31. Refrigerant cylinders should never be filled to more than what percent of their capacity?

1. 65 percent
2. 75 percent
3. 85 percent
4. 95 percent

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Learning Objective:

*Identify components and conditions of the ECS for the cockpit, cabin area, and the nose avionics compartment of the SH-60B helicopter.*

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5-32. The SH-60B helicopter cabin cockpit and nose bay environments are controlled by the ECS, which provides both heating and air conditioning within what temperature range?

1. 2° to 71°C
2. 2° to 73°C
3. 3° to 72°C
4. 5° to 70°C

5-33. Bleed air is applied to the air-cycle machine (ACM) through a modulating valve which functions in what capacity?

1. As an on/off valve and pressure relief valve
2. As an on/off valve and temperature control valve
3. As a pressure regulator and relief valve
4. As an on/off valve and pressure regulator

5-34. With ECS selected ON (from engine source), maximum torque available is reduced by what percent?

1. 1.5
2. 2.5
3. 3.5
4. 4.5

5-35. In an overpressure condition, the overpressure switch will cause which of the following actions?

1. The ECS HI PRESS advisory panel light to come on
2. The modulating valve to close
3. System shutdown only
4. None of the above

5-36. (Refer to figure 3-19 and supporting material in the text.) The ECS control panel contains a three-position toggle switch to control the ECS operating modes. What are the three settings for this toggle switch?

1. OFF, ON, and MAN
2. OFF, AUTO, and MAN
3. OFF, ON, and RAM AIR
4. OFF, AUTO, and RAM AIR

5-37. The ECS will automatically shut down under which of the following conditions?

1. Engine contingency power is selected with the contingency-power switch (CNTGY PWR) on either collective stick
2. In any position of the AIR SOURCE ECS/START switch, when starting either No. 1 or No. 2 engine
3. Both 1 and 2 above
4. None of the above

5-38. Fan control is provided by the mission power (MSU PWR) switch, and by what other switch?

1. A 27°C temperature-sensing switch
2. A 27°C temperature-sensing switch located at each fan outlet
3. A 25°C temperature-sensing switch
4. A 27°C temperature-sensing switch located at each fan inlet

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Learning Objective:

*Recognize the purpose and function of the aircraft pressurization system to include maintenance and troubleshooting operations.*

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- 5-39. What is the total number of cabin pressurization modes of operation provided by the S-3 aircraft pressure regulator control?
1. Five
  2. Two
  3. Three
  4. Four
- 5-40. (Refer to table 3-1 and supporting material in the text.) During flight operations between 5,000 and 24,000 feet, the isobaric mode maintains the cabin altitude within what pressurization range?
1. 3,500 and 4,000 feet
  2. 4,350 and 5,000 feet
  3. 4,500 and 5,000 feet
  4. 5,000 and 5,380 feet
- 5-41. The pressure regulator safety valve is an independent pneumatically operated, balanced poppet valve that limits cabin-to-ambient pressure differential to what pressure range?
1. 7+0.5 and -0.5 psi
  2. 7+0.2 and -0.2 psi
  3. 7+0.2 and -0.1 psi
  4. 7+0.2 and -0.0 psi
- 5-42. The normally open low-pressure switch closes at 13,000  $\pm$ 500 feet and reopens at what altitude?
1. 5,000  $\pm$ 500 feet
  2. 8,000  $\pm$ 500 feet
  3. 9,000  $\pm$ 500 feet
  4. 11,000  $\pm$ 500 feet
- 5-43. Although an AE generally locates and corrects electrical troubles, the AME should be able to check circuits for loose connections and perform continuity checks.
1. True
  2. False
- 5-44. There are how many distinct steps to follow during troubleshooting?
1. Five
  2. Six
  3. Seven
  4. Eight

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Learning Objective:  
*Recognize operating procedures for a multimeter.*

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- 5-45. Which of the following instruments is used to measure direct current, alternating current, and resistance?
1. Direct current meter
  2. Alternating current meter
  3. Ohmmeter
  4. Multimeter
- 5-46. When measuring resistance, in what position should you place the -dc/+dc/ac switch.
1. -dc
  2. +dc
  3. +ac
  4. Resistance
- 5-47. When the multimeter is not in use, in what position should you place the range function switch?
1. Lowest resistance setting
  2. Highest resistance setting
  3. Lowest voltage setting
  4. Highest voltage setting
- 5-48. Which of the following actions should be taken to read the resistance of a component after setting the meter to zero?
1. Keep the meter in the same position
  2. Insert the slack test lead in the (+) jack
  3. Keep the reading on the left of the second scale
  4. All of the above
- 5-49. Ambient temperature affects the resistance of sensors.
1. True
  2. False

---

Learning Objective:  
*Recognize the importance of oxygen to include types, characteristic, and the effects of a lack of oxygen.*

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- 5-50. What is the most urgently needed substance to sustain human life?
1. Food
  2. Oxygen
  3. Water
  4. Clothing
- 5-51. Sea level air pressure is how much greater than air pressure at 18,000 feet?
1. One and one-half times
  2. Twice
  3. Three times
  4. Three and one-half times
- 5-52. What type of oxygen equipment is required on aircraft capable of flying in the 35,000 to 43,000 feet altitude ranges?
1. Demand type
  2. Pressure type
  3. Pressure demand type
  4. Demand pressure type
- 5-53. What kind of oxygen is type 1?
1. Liquid oxygen for technical uses
  2. Gaseous oxygen for technical uses
  3. Gaseous oxygen for aviator's breathing purposes
  4. Liquid oxygen for aviator's breathing purposes
- 5-54. What type of oxygen is type II oxygen, Spec. MIL-O-2720D?
1. Liquid oxygen for technical purposes
  2. Liquid oxygen for aviator's breathing purposes
  3. Gaseous oxygen for technical purposes
  4. Gaseous oxygen for aviator's breathing purposes
- 5-55. Water vapor content is specified for breathing oxygen in order to prevent which of the following problems?
1. Clogging of the oxygen system with ice
  2. Rust from forming in the oxygen system
  3. Excessive humidity in the lungs
  4. Physical injury to the body
- 5-56. What is the natural state of oxygen?
1. Solid
  2. Liquid
  3. Gel
  4. Gas
- 5-57. Oxygen forms what percent by volume of the total composition of the atmosphere?
1. 12%
  2. 21%
  3. 52%
  4. 78%
- 5-58. What is the most plentiful element in our environment?
1. Chlorine
  2. Argon
  3. Nitrogen
  4. Oxygen
- 5-59. Which of the following are characteristics of oxygen?
1. Weightless, colorless, and tasteless
  2. Tasteless, valueless, and odorless
  3. Colorless, odorless, and tasteless
  4. Volumeless, weightless, and colorless
- 5-60. The most rapid oxidation is found in which of the following processes?
1. Rust
  2. Combustion
  3. Evaporation
  4. Liquefaction
- 5-61. Oxygen is found in which of the following chemical states?
1. Gas or solid only
  2. Gas or liquid only
  3. Liquid or solid only
  4. Gas, liquid, or solid
- 6-62. One gallon of liquid oxygen weighs how many pounds?
1. 6.00 pounds
  2. 8.49 pounds
  3. 9.52 pounds
  4. 16.00 pounds

- 5-63. A complete lack of oxygen, which causes death, is called anoxia,
1. True
  2. False
- 5-64. Which of the following statements concerning hypoxia is NOT true?
1. Individuals vary in their reactions to hypoxia
  2. The same sensations experienced in suffocation are present in hypoxia
  3. The effects of a certain degree of hypoxia on a person cannot be accurately predicted
  4. A person may be highly susceptible to hypoxia one day and relatively resistant to it the next
- 5-65. In order to determine when supplemental oxygen is needed, the aviator must depend on what factor or device?
1. His judgement
  2. The altimeter
  3. His sensations
  4. The flow indicator
- 5-66. Generally, what parts of the body are first affected by hypoxia?
1. Ears
  2. Eyes
  3. Lungs
  4. Muscles
- 5-67. At what minimum altitude will hypoxia appreciably impair night vision?
1. 5,000 feet
  2. 7,500 feet
  3. 10,000 feet
  4. 12,000 feet
- 5-68. At altitudes between 10,000 and 15,000 feet, what is the greatest danger from hypoxia?
1. Headache
  2. Drowsiness
  3. Poor vision
  4. Error in judgement
- 3-69. Most of the anoxia deaths during World War II occurred in which of the following altitude ranges?
1. 10,000 to 15,000 feet
  2. 15,000 to 20,000 feet
  3. 20,000 to 25,000 feet
  4. 25,000 to 30,000 feet

# Assignment 6

Textbook Assignment: "Oxygen Systems." Pages 4-4 through 4-18.

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Learning Objective:

Identify safety precautions, components, typical systems, and maintenance procedures for gaseous oxygen systems.

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- 6-1. A minimum of 50 psi must be maintained in a gaseous oxygen supply cylinder. What could be the result of not maintaining this minimum pressure?
1. The oxygen regulators would not function properly
  2. The crew member's masks would not function properly
  3. Cockpit odors would be allowed to enter the oxygen cylinders
  4. Moisture would be allowed to accumulate in the cylinders
- 6-2. Pressurized oxygen is potentially very dangerous, therefore; personnel must be very knowledgeable and extremely cautious when handling oxygen or servicing and maintaining oxygen systems.
1. True
  2. False
- 6-3. Personnel servicing or maintaining oxygen systems and components must be meticulously careful to protect systems from which of the following substances?
1. Grease and oil
  2. Hydraulic fluid
  3. Both 1 and 2 above
  4. Type 1 trichlorotrifluoroethane
- 6-4. When oxygen cylinders are handled or transported, the valve protection cap must be in place and, prior to removing the cap and opening the valve, the cylinders must be firmly held in place.
1. True
  2. False
- 6-5. Anyone familiar with the established color codes provided in MIL-STD-101A can identify the contents of a cylinder as oxygen because it is painted what color?
1. Gray
  2. Blue
  3. Green
  4. Yellow
- 6-6. Oxygen cylinder valves are equipped with a fusible metal safety plug filled with a fusible metal designed to melt within what temperature range?
1. 190° to 207°F
  2. 208° to 220°F
  3. 221° to 245°F
  4. 246° to 268°F
- 6-7. The self-opening (automatic) oxygen cylinder valve is automatically opened under what conditions?
1. When the pilot inhales
  2. When a lever is positioned to ON
  3. When the pressure is over 500 psi
  4. When it is connected to the oxygen line
- 6-8. Which of the following regulator maintenance tasks are NOT performed by AMEs?
1. Removal
  2. Installation
  3. Repairs
  4. Operational checks

- 6-9. The tubing used in aircraft high-pressure oxygen systems is made from which of the following types of metal?
1. Copper
  2. Steel
  3. Bronze
  4. Aluminum
- 6-10. What lines run from the oxygen cylinders to the regulators?
1. Filler
  2. Cylinder
  3. Regulator
  4. Distribution
- 6-11. Oxygen lines are identified by strips of what color paint and/or tape?
1. White paint
  2. Blue and white tape
  3. Green and white tape
  4. Green paint
- 6-12. At what minimum pressure is type N tubing pressure tested?
1. 300 psi
  2. 450 psi
  3. 1,800 psi
  4. 3,000 psi
- 6-13. For which of the following connections is high-pressure tubing NOT used?
1. The cylinder valve and the regulator inlet in high-pressure systems
  2. The cylinder valve and the pressure reducer in reducer high-pressure systems.
  3. The pressure reducer and the outlets in reduced high-pressure systems
  4. The oxygen cylinder valve and the filler connection in both high and low-pressure systems
- 6-14. Adapters and fittings are connected to the ends of copper tubing in high-pressure oxygen systems in what manner?
1. Flared
  2. Electric arc welded
  3. Silver soldered
  4. Tin and lead soldered
- 6-15. Some later models of naval aircraft with high-pressure oxygen will have which of the following types of tubing in the oxygen system?
1. Aluminum-alloy
  2. Stainless steel
  3. Both 1 and 2 above
  4. Aluminum
- 6-16. If a line in a gaseous oxygen system ruptures, the loss of the entire oxygen supply is prevented by which of the following valves?
1. Check
  2. Filler
  3. Shutoff
  4. Pressure-reducing
- 6-17. Check valve castings have arrows embossed on them to provide what information?
1. The direction of the master oxygen supply
  2. The direction of flow through the valve
  3. The section of the valve to be mounted facing aft
  4. The section of the valve to be mounted facing forward
- 6-18. In some oxygen systems, high cylinder pressure is changed to a low working pressure by which of the following valves?
1. Pressure-reducing
  2. Manifold control
  3. Cylinder control
  4. Filler control
- 6-19. Pressure reducers are always in what locations?
1. Oxygen distribution lines
  2. Cylinder outlet caps
  3. Filler valve inlets
  4. Regulator outlets
- 6-20. What valve, located within the common filler valve, opens during the oxygen system filling operation and closes when filling is complete?
1. Check
  2. Shutoff
  3. Regulator
  4. Pressure-reducing

6-21. If the pressure gauge on a 500 psi low-pressure system indicates 125 psi, what fractional part of the oxygen is left?

1. One-fourth
2. One-half
3. Two-thirds
4. Three-fourths

6-22. High-pressure gaseous oxygen system pressure gauges mounted at each flight station are calibrated to indicate pressure ranging from 0 to what maximum pressure?

1. 500 psi
2. 1,500 psi
3. 1,800 psi
4. 2,000 psi

6-23. What type of oxygen system usually uses pressure reducers in the distribution lines?

1. Low-pressure system
2. High-pressure system
3. Reduced high-pressure system
4. Reduced low-pressure system

6-24. In the reduced high-pressure oxygen system, a malfunctioning pressure reducer will be indicated by which of the following actions?

1. Rapid decline of quantity on the quantity gauge
2. Illumination of the low quantity light
3. Both 1 and 2 above
4. Rupture of the green disc in the discharge indicator

6-25. What items or devices should be used as a handle to carry the portable oxygen walkaround unit?

1. Regulator
2. Straps
3. Breathing tube
4. Copper tubing

6-26. An AME can intelligently locate a malfunctioning component in a gaseous oxygen system without being familiar with the system or knowing the function of each component within the system.

1. True
2. False

---

Learning Objective:  
*Identify safety precautions, components, installation and testing of components, and operating procedures for liquid oxygen (LOX) systems.*

---

6-27. Liquid oxygen will remain a liquid under normal atmospheric pressure at what temperature?

1. -320°F
2. -297°F
3. -220°F
4. -182°F

6-28. What is the expansion ratio of liquid oxygen to gaseous oxygen?

1. 962-1
2. 862-1
3. 782-1
4. 692-1

6-29. Personnel that could be exposed to accidental spillage of LOX must wear which of the following equipment?

1. Face shield
2. Gloves and oxygen safety shoes
3. Coveralls
4. Each of the above

6-30. The combustion supporting potential of oxygen is a greater danger than freezing.

1. True
2. False

6-31. When transferring LOX from one container to another, which of the following precautions should be taken?

1. Pour slowly to avoid splashing the liquid out of the container
2. Four slowly to allow the receiving receptacle to cool sufficiently without thermal breakage
3. Both 1 and 2 above
4. Minimize LOX from venting into the atmosphere by pouring as rapidly as possible



- 6-32. How many psi of pressure will LOX generate if it is allowed to evaporate at atmospheric pressure in a sealed container that has no relief provisions?
1. 10,000
  2. 12,000
  3. 14,000
  4. 16,000
- 6-33. The pressure relief assembly in LOX system storage vessels consists of which of the following items?
1. A ruptured disc
  2. A reseatable relief valve
  3. Both 1 and 2 above in series
  4. Both 1 and 2 above in parallel
- 6-34. Which of the following statements is correct concerning the stowage of LOX containers?
1. Hydrocarbons in the vicinity of stowed LOX containers do not present a hazardous condition
  2. LOX containers should not be stowed in the vicinity of flammable gases or liquids
  3. Because of the insulation in LOX containers, open, outside stowage is desirable
  4. Stowage of LOX containers must be in refrigeration spaces
- 6-35. When dealing with LOX leakage or spillage, which of the following actions should be taken?
1. Immediately mop up the LOX and hose down with water
  2. Immediately hose down the area with water
  3. Dilute the LOX with a caustic soda and hose down with water
  4. Ventilate the leakage or spillage to allow LOX to evaporate into the atmosphere
- 6-36. What action should be taken when an article of clothing you are wearing comes in contact with LOX?
1. Separate the article of clothing from skin contact immediately, and thoroughly air clothing to allow dilution of the oxygen
  2. Apply large quantities of water to the clothing area that has come in contact with the LOX
  3. Remove the contaminated article of clothing and discard
  4. Remove the contaminated article of clothing for washing
- 6-37. For what reason must a completely empty aircraft LOX converter be serviced slowly?
1. To allow the system to be completely filled
  2. To prevent possible damage to the converter by thermal shock
  3. To allow the safety valves in the system time to adjust to the servicing
  4. To prevent the thermal relief valve from operating prematurely
- 6-38. What is the advantage of using liquid oxygen systems over gaseous oxygen systems on aircraft?
1. Liquid systems are less dangerous
  2. One LOX converter replaces several cylinders of gaseous oxygen
  3. Liquid systems are more efficient
  4. Liquid oxygen is more economical to manufacture

6-39. A LOX converter consists of a steel inner and outer shell. If a leak should develop in the inner shell an explosion could occur. Which of the following components prevents an explosion from occurring?

1. Pressure relief valve
2. Blowout disc
3. Pressure regulator
4. Each of the above

6-40. When servicing an aircraft LOX system, what prevents liquid from flowing into the oxygen system supply port?

1. One-way check valve
2. Isolation valve
3. Filler valve
4. Two-way check valve

6-41. During servicing of an aircraft LOX system, a means for venting is needed. What valve in the oxygen system provides this venting?

1. Spring-loaded check valve
2. Pressure relief valve
3. Vent valve
4. Filler valve

6-42. If for some reason the spring fails to tightly hold the poppet in the filler port on its seat after the LOX cart has been disconnected from the aircraft, oxygen from an aircraft's converter will not escape into the atmosphere because of what valve or poppet?

1. Check valve in the filler port
2. Check valve in the converter supply line
3. Filler valve supply poppet
4. Converter pressure control valve

IN ITEMS 6-43 THROUGH 6-48, SELECT FROM COLUMN B THE LOX SYSTEM COMPONENT THAT PERFORMS THE FUNCTION LISTED IN COLUMN A. COMPONENTS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions</u>	<u>B. Components</u>
6-43.	Operates when the pressure control valve malfunctions	1. Pressure opening valve
6-44.	Controls the flow of gaseous oxygen into the supply line	2. Pressure closing valve
6-45.	Prevents system contamination when the converter is removed	3. Relief valve
6-46.	Prevents excess pressure from building up in the system when not in use	4. Quick-disconnect coupling
6-47.	Allows easy removal of the LOX converter from the aircraft	
6-48.	Maintains operating pressure within the converter	
6-49.	What is the purpose of the heat exchanger in a LOX system?	
	1. To cool the LOX leaving the servicing cart to prevent damage to the aircraft's LOX converter	
	2. To increase the temperature of the LOX leaving the aircraft's converter	
	3. To prevent damage to the lungs of the crew member breathing the oxygen	
	4. To convert the LOX to gaseous oxygen	

- 6-50. What is the purpose of the low-pressure switch in an aircraft's oxygen supply line?
1. To operate the oxygen caution light
  2. To cut off oxygen servicing when the aircraft system is full
  3. To warn personnel servicing the aircraft that the system is approaching full
  4. To complete the electrical circuit to the LOX quantity indicator
- 6-51. How does a crew member know when the LOX( system is in a low state?
1. By dchecking the quantity indicator
  2. By the illumination of a low quantity light
  3. By both 1 and 2 above
  4. By checking the oxygen pressure gauge
- 6-52. What is incorporated in the LOX system to protect the pressure regulator and crew member from excessive pressure should the LOX converter malfunction?
1. A thermal expansion valve located between the LOX converter and the oxygen regulator
  2. A thermal expansion valve located in the LOX converter
  3. A relief valve located in the LOX converter
  4. A relief valve located in the oxygen shutoff valve
- 6-53. Which of the following types of tubing is used in LOX systems aboard aircraft?
1. Low-pressure aluminum alloy
  2. High-pressure aluminum alloy
  3. Low-pressure stainless steel
  4. High-pressure stainless steel

IN ITEMS 6-54 THROUGH 6-58, SELECT FROM COLUMN B THE ACTION THAT RESULTS FROM THE MINIATURE OXYGEN BREATHING REGULATOR FUNCTIONS LISTED IN COLUMN A. ACTIONS IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Functions.</u>	<u>B. Action</u>
6-54.	Oxygen flow from the paddle base area produces a pressure drop behind the demand valve diaphragm	<ol style="list-style-type: none"> <li>1. Oxygen flow</li> <li>2. Safety pressure obtained</li> <li>3. Automatic pressure breathing</li> <li>4. Opens the mask exhalation valve</li> </ol>
6-55.	The sensing diaphragm returns to the balanced position	
6-56.	The small volume bleed vent closes the aneroid vent and builds up pressure on the sensing diaphragm	
6-57.	The sensing diaphragm force is equal to the aneroid chamber force	
6-58.	The relief valve acts as a pivot device	
6-59.	Which of the following are low pressure oxygen regulators?	<ol style="list-style-type: none"> <li>1. Miniature and MD-2</li> <li>2. Miniature and MD-1</li> <li>3. MD-1 and MD-2</li> <li>4. Miniature only</li> </ol>

THE MD TYPE OXYGEN REGULATORS HAVE THREE TOGGLES. IN ITEMS 6-60 THROUGH 6-65, MATCH THE SPECIFIC TOGGLE LISTED IN COLUMN B WITH THE ACTION STATEMENT LISTED IN COLUMN A. THE TOGGLE IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. Action</u>	<u>B. Toggles</u>
6-60.	Used to cutoff the oxygen supply to the regulator	1. supply toggle
6-61.	Used to obtain 100% oxygen at 10,000 ft	2. Diluter toggle
6-62.	Used to deliver positive pressure to the mask at crew member demand	3. Emergency toggle
6-63.	Used for checking the fit of the mask	
6-64.	Has a position labeled normal oxygen	
6-65.	Can be placed in one of three positions	

# Assignment 7

Textbook Assignment: "Oxygen System"; and "Oxygen Support Equipment."  
Pages 4-19 through 5-16.

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Learning Objective:  
*Identify safety precautions, components, installation and testing of components, and operating procedures for liquid oxygen (LOX) systems. (This objective is continued from assignment 6.)*

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- 7-1. What component in the MD type regulator protects it from overpressure?
1. Second stage relief valve
  2. First stage relief valve
  3. Venturi assembly
  4. Aneroid check valve
- 7-2. Ambient air for mixing with oxygen passes through what component in an MD type regulator?
1. Demand valve assembly
  2. Demand diaphragm chamber
  3. Venturi assembly
  4. Diluter aneroid assembly
- 7-3. What component in the MD type regulator prevents oxygen from flowing out through the inlet ports?
1. Demand valve assembly
  2. Diluter aneroid assembly
  3. Venturi assembly
  4. Aneroid check valve
- 7-4. Pressure breathing above 30,000 feet is a feature of MD type pressure regulators. Which of the following is one of the components in the regulator that provides this feature?
1. Aneroid assembly
  2. Demand valve assembly
  3. Diluter aneroid assembly
  4. Aneroid check valve assembly
- 7-5. Fire and/or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.
1. True
  2. False
- 7-6. In making a functional check of the MD type regulator, a properly operating regulating will be indicated on the flow indicator in which of the following ways?
1. The indicator will show movement from the zero position-when inhaling
  2. The indicator will show movement from the zero position when exhaling
  3. The indicator will show white when inhaling and black exhaling
  4. The indicator will show white when exhaling and black inhaling
- 7-7. When making a functional check of an oxygen system that uses the MD type regulator, what position must the emergency lever be in to check for oxygen supply through the regulator at ground level?
1. Emergency
  2. 100-percent oxygen
  3. Normal
  4. ON

- 7-8. When making a functional check of an oxygen regulator, holding the emergency pressure control lever in the TEST MASK position produces which of the following results on the oxygen regulator panel?
1. The lamp will light
  2. An increase in pressure on the pressure gauge
  3. The flow indicator will go to the white position
  4. Each of the above
- 7-9. What are the LOX converter's three sequences of operation?
1. Service, supply, and reservice
  2. Fill, buildup, and supply
  3. Reservice, supply, and buildup
  4. Buildup, supply, and standby

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IN ITEMS 7-10 THROUGH 7-14, SELECT FROM COLUMN B THE SEQUENCE OF LOX SYSTEM OPERATION THAT IS AUTOMATICALLY STARTED BY EACH ACTION/VALVE OPERATION LISTED IN COLUMN A. SEQUENCES OF OPERATION IN COLUMN B MAY BE USED MORE THAN ONCE.

	A. Actions/ Valves <u>Operations</u>	B. Sequence of Operations
7-10.	The differential check valve opens	<ol style="list-style-type: none"> <li>1. Fill</li> <li>2. Buildup</li> </ol>
7-11.	The trailer hose nozzle is removed from the converter	<ol style="list-style-type: none"> <li>3. Demand mode</li> <li>4. Supply-economy mode</li> </ol>
7-12.	The pressure opening valve unseats	
7-13.	The trailer hose nozzle is connected to the filler port	
7-14.	When oxygen becomes available at the supply outlet	

- 7-15. When installing a section of tubing in an aircraft's oxygen system, which of the following items is permitted for use on the threads of the tubing connections prior to tightening?

1. Locktite
2. Waterproof grease
3. Antiseize tape
4. Thread compound

---

Learning Objective:  
*Identify the system components and operation of the onboard oxygen generating system (OBOGS).*

---

- 7-16. Which of the following is an advantage of the OBOGS as compared to the LOX system?

1. An OBOGS requires no extensive depot-level maintenance
2. An OBOGS eliminates the need for daily servicing
3. An OBOGS requires no special transportation and storage equipment
4. Each of the above

- 7-17. Scheduled preventive maintenance occurs at what number of hours on the OBOGS?

1. 1,000 hours
2. 2,000 hours
3. 3,000 hours
4. 4,000 hours

- 7-18. Through which of the following components does the OBOGS receive engine bleed air?

1. Engine turbine
2. Heat exchanger
3. Cooling turbine
4. Ram air outlet

- 7-19. Which, if any, of the following elements is retained in the molecular sieve beds as the airflow passes through them?

1. Oxygen
2. Nitrogen
3. Argon
4. None of the above

7-20. What component acts as a surge tank and an accumulator for the OBOGS?

1. Plenum
2. Reservoir
3. Heat exchanger
4. Oxygen monitor

---

Learning Objective:

*Describe safety precautions and handling procedures for liquid oxygen (Lox) storage tanks, transfer lines, and valves.*

---

7-21. LOX storage tanks consist of what components?

1. Single containers
2. High density containers
3. Outer and inner containers
4. Low density containers

7-22. The annular insulated space between containers of LOX storage tanks is vacuum pressurized.

1. True
2. False

7-23. Significant waste of LOX by the transfer hose/line is due to what factor?

1. Leaks
2. Cooldown
3. Improper connection
4. O-ring failure

7-24. Flexible metal hose under high pressure reacts in what manner?

1. It expands in length only
2. It expands in diameter only
3. It expands in length and diameter
4. It does not expand

7-25. LOX should never be trapped in a line between closed valves because of what occurrence?

1. The valves will freeze
2. The line will freeze
3. Excessive pressure can develop in the line
4. Pressure in the tank will bleed off

7-26. Which of the following components of a LOX storage system causes the most trouble?

1. Relief valve
2. Low temperature valve
3. Servicing hose
4. Rupture disc

7-27. Which of the following methods is most effective in insulating LOX valves?

1. Vacuum jacketing
2. Fiber glass insulation
3. Polyethylene foam insulation
4. Heater jacketing

---

Learning Objective:

*Describe oxygen servicing equipment to include safety precautions, service trailers, and system servicing.*

---

7-28. What should be the first aid provided if LOX is splashed on the skin?

1. Coat the area with petroleum jelly
2. Wrap the area with dry cloth
3. Wrap the area with damp cloth
4. Flush the area with water

7-29. Which of the following valves must be in the open position when a LOX oxygen trailer is not in use?

1. Buildup
2. Supply
3. Fill drain
4. Vent

7-30. In the LOX handling area, what is the safe distance permitted for smoking or open flames?

1. 25 feet
2. 50 feet
3. 75 feet
4. 100 feet

- 7-31. What is the major difference between the standard and the closed loop LOX trailers?
1. The closed loop trailer operates on a higher pressure
  2. The closed loop trailer recaptures vented LOX losses
  3. The standard trailer operates faster
  4. The standard trailer is more economical
- 7-32. Which of the following safety hazards is eliminated by use of the closed loop LOX cart?
1. Venting oxygen
  2. Trapped liquid in the lines
  3. Static discharge
  4. Overpressurization
- 7-33. The transfer tank of the closed loop LOX trailer has what capacity?
1. 15 liters
  2. 25 liters
  3. 50 liters
  4. 65 liters
- 7-34. To what minimum number of microns is the 30-gallon storage tank of the closed loop LOX trailer evacuated?
1. 5
  2. 7
  3. 9
  4. 11
- 7-35. What is the primary function of the 15-liter transfer tank?
1. To maintain system pressure
  2. To hold small volumes of LOX for transfer
  3. To maintain system temperature
  4. To pressurize the 50 gallon storage tank
- 7-36. To transfer LOX to the converter, the transfer tank pressure must be in what relationship with the storage tank pressure?
1. Less than storage tank pressure
  2. Greater than storage tank pressure only
  3. Equal to storage tank pressure only
  4. Greater than or equal to storage tank pressure
- 7-37. When using the closed loop LOX trailer, when the converter is full, the converter full indicator gauge displays what reading?
1. 5 liters
  2. 10 liters
  3. Full
  4. Liquid
- 7-33. Which of the following gauges does not have green and red indicating bands?
1. The transfer tank pressure gauge
  2. The storage tank pressure gauge
  3. The storage tank liquid level gauge
  4. The transfer tank liquid level gauge
- 7-39. Pressure in the storage tank of the closed loop LOX trailer must not exceed what pressure?
1. 55 psi
  2. 65 psi
  3. 75 psi
  4. 85 psi
- 7-40. Under normal conditions, using a 30 psig transfer pressure, the TMU 70/M LOX trailer should fill in what maximum length of time?
1. 1 to 2 minutes
  2. 5 to 10 minutes
  3. 12 to 15 minutes
  4. 20 to 30 minutes
- 7-41. You should never let the transfer tank pressure of the closed loop LOX trailer exceed what maximum pressure?
1. 30 psi
  2. 50 psi
  3. 70 psi
  4. 90 psi
- 7-42. At what maintenance level are AMEs allowed to perform maintenance on LOX trailers?
1. Organizational
  2. Intermediate
  3. Depot
  4. Both 2 and 3 above



7-43. Which, if any, of the following fire-fighting agents is authorized for use on LOX enriched fires?

1. Soda acid
2. Methyl bromide
3. Carbon tetrachloride
4. None of the above

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Learning Objectives:

*Recognize contamination control procedures for oxygen equipment to include detection, purging, and purging equipment.*

---

7-44. How often must an odor test be performed on a LOX trailer when it is not in use?

1. Every day
2. Every 3 days
3. Every 6 days
4. Every 9 days

7-45. How often must an odor test be performed on an aircraft oxygen system?

1. When painting has been performed on the aircraft
2. When odors are reported by the pilot or aircrew
3. When the aircraft oxygen system is found to have a leak
4. When a phase inspection is performed

7-46. How many milliliters of LOX is used to perform an odor test?

1. 100
2. 200
3. 300
4. 400

7-47. During an odor test, odors will be most prevalent under which of the following conditions?

1. While liquid is in the beaker
2. Fifteen to twenty minutes after the liquid has evaporated
3. Both 1 and 2 above
4. When the beaker has warmed to nearly room temperature

7-40. If odors are discovered during an odor test, what procedure must be performed on the converter or LOX system?

1. It must be refilled and retested.
2. It must be sampled and tested by NADEF
3. It must be purged in accordance with existing directives
4. It must be wet cleaned and refilled

7-49. What is the most dangerous contaminant of LOX?

1. Water vapor
2. Nitrogen
3. Hydrocarbons
4. Inert solids

7-50. Which of the following is NOT a psychological effect of hydrocarbon contamination in LOX?

1. Uneasiness
2. Apprehension
3. Panic
4. Asphyxia

7-51. Which of the following is NOT a physiological effect of hydrocarbon contamination in LOX?

1. Panic
2. Nausea
3. Illness
4. Intoxication

7-52. Acetylene is the most hazardous hydrocarbon contaminant in LOX because of its ability to cause which of the following conditions?

1. Freezing of the lines
2. Internal corrosion of oxygen regulators
3. Both 1 and 2 above
4. It becomes its own source of ignition

7-53. Which of the following LOX contaminants will cause mechanical malfunctions of LOX system components?

1. Water vapor
2. Fibers
3. Nitrous oxide
4. Halogenated compounds

- 7-54. Base LOX storage tanks will be tested for odor a minimum of how often?
1. Every 7 days
  2. Every 14 days
  3. Every 21 days
  4. Every 28 days
- 7-55. LOX samples are prepared for use by what organization?
1. The AME shop
  2. The AIMD paraloft
  3. The ground support equipment work center
  4. The depot maintenance activity
- 7-56. The sampler, as received by the using activity, is sealed and contains gaseous oxygen at what pressure?
1. 5 psi
  2. 10 psi
  3. 15 psi
  4. 20 psi
- 7-57. A LOX sampler received without a residual gaseous oxygen pressure should be given what treatment?
1. Purged before use
  2. Wet cleaned and purged before use
  3. Rejected and returned
  4. Dried in an oven before use
- 7-58. What is the maximum number of ways to purge oxygen containers?
1. One
  2. Two
  3. Three
  4. Four
- 7-59. What is the purpose of the LOX wash method of purging?
1. To purge LOX lines
  2. To lower the contamination of LOX trailers
  3. To purge gaseous oxygen cylinders
  4. To lower the contamination of LOX converters
- 7-60. Aircraft LOX converters must, be purged under which of the following conditions?
1. Before putting them into service
  2. If allowed to run dry
  3. If odor is detected
  4. Each of the above
- 7-61. The hot nitrogen gas used in purging LOX converters must be at what minimum temperature?
1. 100°F
  2. 150°F
  3. 200°F
  4. 250°F
- 7-62. The hot nitrogen gas used in purging a LOX converter is regulated to what minimum pressure?
1. 30 psi
  2. 40 psi
  3. 50 psi
  4. 60 psi
- 7-63. What is the minimum amount of time a converter should be purged?
1. One hour
  2. Two hours
  3. Three hours
  4. Four hours
- 7-64. What should be the minimum temperature of the hot nitrogen exiting a converter being purged?
1. 50°F
  2. 100°F
  3. 150°F
  4. 200°F
- 7-65. After a LOX converter has been purged and serviced, an odor test is performed. If odors persist, the converter must be subjected to what action?
1. Repurging
  2. Turn into supply
  3. Routing to NADEP
  4. Wet cleaning

- 7-66. The gas purging set is designed to be used with which of the following gases?
1. Hydrogen
  2. Nitrogen
  3. Helium
  4. Argon
- 7-67. Which of the following gases can be used with the gas purging set if water pumped gaseous nitrogen is not available?
1. Helium
  2. Hydrogen
  3. Oxygen
  4. Argon
- 7-68. On the gas purging set, the high pressure relief valve relieves pressure in excess of what maximum pressure?
1. 3,550 psi
  2. 3,600 psi
  3. 3,675 psi
  4. 3,750 psi
- 7-69. The high pressure gas from the gas supply cylinders is reduced to what pressure range?
1. 40  $\pm$ 5 psi
  2. 50  $\pm$ 5 psi
  3. 60  $\pm$ 5 psi
  4. 70  $\pm$ 5 psi
- 7-70. Gas passing through the heater assembly is heated to what maximum temperature?
1. 165°F
  2. 205°F
  3. 255°F
  4. 285°F
- 7-71. The gas exiting the filler valve of the gas purging set will be within what maximum temperature range?
1. 125  $\pm$ 25°F
  2. 225  $\pm$ 25°F
  3. 285  $\pm$ 50°F
  4. 325  $\pm$ 50°F
- 7-72. A high temperature safety switch is incorporated in the system. It will break the electrical circuit to the heater assembly when heater assembly temperature exceeds what maximum temperature?
1. 175°F
  2. 200°F
  3. 250°F
  4. 300°F

# Assignment 8

Textbook Assignment: "Oxygen Support Equipment"; and "Canopy Systems."  
Pages 5-16 through 6-25."

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Learning Objective;  
*Identify components and  
operating procedures for  
gaseous oxygen servicing  
trailers.*

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- 8-1. What maximum number of manifold control valves are located on the No-2 oxygen trailer?
- 1.
  - 5
  - 6
  - 8
- 8-2. The No-2 oxygen trailer has two pressure regulators to ensure uninterrupted operation should one fail.
- True
  - False
- 8-3. The recharge valve on the No-2 oxygen trailer is provided for recharging the trailer cylinders directly through what device(s)?
- The lower manifold
  - The upper manifold
  - One of the two pressure regulators
  - The servicing hose and line valve
- 8-4. Where are the four shutoff valves located on the No-2 oxygen trailer?
- On the upper manifold
  - On the lower manifold
  - One on the inlet and outlet side of each pressure regulator
  - On the drier assembly
- 8-5. The lower manifold is connected to the drier assembly by what hose or line?
- Flexible hose
  - Steel line
  - Aluminum line
  - Copper line
- 8-6. The oxygen flows through the top of the dryer, passes down through the drying agent, and out through the servicing hose.
- True
  - False
- 8-7. Because gaseous oxygen cylinders must never be completely drained, residual pressure in O<sub>2</sub> cylinders should never be allowed to fall below what minimum pressure?
- 10 psi
  - 50 psi
  - 90 psi
  - 100 psi
- 8-8. Prior to removal or installation of oxygen cylinders on the No-2 oxygen trailer, cylinder safety caps will be installed.
- True
  - False
- 8-9. After 12 cylinders of oxygen have been used, the drying agent should be subjected to what action?
- Inspection
  - Changing
  - Drying
  - Destruction
- 8-10. What is the color of the drying agent in the dryer?
- Blue
  - White
  - Red
  - Green

- 8-11. When moisture is present in the oxygen system, the color of the indicating agent will change to what color?
1. White
  2. Black
  3. Green
  4. Pink
- 8-12. The indicating agent is well mixed with the drying agent.
1. True
  2. False
- 8-13. How should the caps on the dryer be tightened?
1. By hand only
  2. To specified torque
  3. With a strap wrench
  4. With a pipe wrench
- 8-14. If leakage occurs around the dryer caps, what is the most probable cause of the leak?
1. A cross-threaded cap
  2. A crack in the dryer
  3. A bad O-ring
  4. A weak marmon clamp
- 8-15. What information do the daily, preoperational, or periodic maintenance requirement cards for the No-2 oxygen trailer provide?
1. Instructions for repair
  2. Instructions for adjustments
  3. A means of rectifying defective conditions
  4. The minimum requirements necessary to maintain the equipment and ensure that no item is overlooked
- 8-16. The daily requirements should be accomplished prior to the first use of the equipment for that day.
1. True
  2. False
- 8-17. A temperature correction chart to determine the pressure to which aircraft cylinders should be filled may be found in what location(s)?
1. In the oxygen trailer daily requirement cards
  2. In the oxygen trailer maintenance requirement cards
  3. On the aircraft oxygen cylinders
  4. In the applicable MIM or on the side of the No-2 oxygen servicing trailer
- 8-18. Oxygen under high pressure will increase in temperature during the servicing procedure.
1. True
  2. False
- 
- Learning Objective:  
*Identify the components, operation, maintenance requirements, emergency survival equipment, and cartridge-actuated devices (CAD) for the ESCAPAC 1E-1 ejection seat.*
- 
- 8-19. The ESCAPAC 1E-1 seat provides escape capabilities within what ejection parameters?
1. Ground level and 0-knots
  2. All altitudes and airspeeds
  3. Both 1 and 2 above
  4. A minimum altitude of 50 feet and 100 knots
- 8-20. The rocket catapult is fired by what initiator?
1. M99
  2. 0.5-second delay
  3. Mk 86
  4. 0.3-second delay
- 8-21. Which of the following components prevent the forward seat from firing before the rear seat?
1. An in-line restrictor
  2. Mk 11 Mod 0 initiator
  3. Selector valve
  4. Diverter manifold

- 8-22. Which of the following actions is caused by rotation of the bell crank attached to the harness release actuator?
1. Survival kit and shoulder harness pins are released
  2. Retaining pin is retracted from the firing disconnect
  3. Seat/man separator racket is ignited
  4. Each of the above
- 8-23. Upon seat/man separation, the main parachute will deploy after a delay of what minimum number of seconds?
1. 0.10 second
  2. 0.25 second
  3. 0.55 second
  4. 1.25 seconds
- 8-24. An aneroid prevents deployment of the main parachute if ejection is above what minimum altitude?
1. 12,500 ft
  2. 13,000 ft
  3. 14,000  $\pm$ 500 ft
  4. 15,500  $\pm$ 500 ft
- 8-25. Which of the following components is used to prevent accidental seat ejection?
1. Initiator safety pin
  2. Safety disconnect
  3. Head knocker
  4. Face curtain safety pin
- 8-26. Which of the following components is NOT located under the seat bucket?
1. Gyro spin-up cartridge
  2. Vernier rocket
  3. Pitch stabilization control
  4. Yaw thruster
- 8-27. What prevents incorrect installation of the yaw thruster?
1. Tapered bolts
  2. Boss and fixed stop
  3. Flat-sided clevis pin
  4. Mechanical guide groove
- 8-28. The yaw vane provides enough drag to yaw the seat what minimum number of degrees?
1. 10
  2. 20
  3. 30
  4. 40)
- 8-29. The delay cartridge in the harness release actuator is fired by what means?
1. A spring action
  2. A trip rod
  3. Hydraulic pressure
  4. Gas pressure
- 8-30. After ejection, the aircrewman is separated from the seat by what action?
1. A rocket
  2. Pushing down and back on the seat
  3. Air blast
  4. A drague chute
- 8-31. The seat height actuator is driven by what motor or pressure?
1. A 2B-volt electric motor
  2. Hydraulic pressure
  3. A 115/120-volt electric motor
  4. Pneumatic pressure
- 8-32. How many M99 initiators are installed in the four seat positions of the S-3 aircraft?
1. 4
  2. 6
  3. 8
  4. 12
- 8-33. Which of the foallowing component is mounted on the ejection seat?
1. Guide rails
  2. Seat height control
  3. M99 initiator
  4. Firing rods
- 8-34. How many M53 initiators are installed in the ejection seat plumbing?
1. 9
  2. 11
  3. 13
  4. 15

- 8-35. How many 0.3-second delay initiators are installed in the s-3 seat ejection system?
1. 5
  2. 7
  3. 3
  4. 10
- 8-36. How many check valves are installed in the ejection seat plumbing?
1. 17
  2. 20
  3. 29
  4. 32
- 8-37. Group ejection is controlled by what individual(s)?
1. Pilot only
  2. Copilot only
  3. Pilot/copilot
  4. None of the above
- 8-38. Which of the following components routes gas pressure to the ejection sequencing system?
1. Selector valve
  2. Delay initiator
  3. Sequencing valve
  4. Gas manifold
- 8-39. The altitude sensor switch provides which of the following functions?
1. On ejection, it prevents seat separation above 15,000 feet
  2. Monitors aircraft altitude
  3. Locks the parachute spreader gun below 14,500 feet
  4. Monitors ,cabin pressure
- 8-40. Which of the following signals warn the TACCO and SENSO that group ejection is going to take place?
1. Bell
  2. Buzzer
  3. Eject warning flag
  4. Flashing indicator lights
- 8-41. When the aircraft is on the ground, crew members conduct an emergency exit by what means?
1. Manually jettisoning the canopy
  2. A window/hatch severance system
  3. Ejecting through the canopy
  4. Manually cutting through the canopy
- 8-42. The emergency egress system can be initiated from any one of how many positions?
1. Five
  2. Two
  3. Three
  4. Four
- 8-43. Which of the following statements regarding the emergency egress system is NOT true?
1. It is more reliable than a hot gas system
  2. It is slower than a hot gas system
  3. It is safer than other like systems
  4. It is an inert system when properly safetied
- 8-44. The window/hatch jettison system is actuated by which of the following methods/components?
1. Electrical switch
  2. Hydraulic pressure
  3. Initiator gas pressure
  4. Pneumatic bypass valve
- 8-45. The wing-to-fuselage fillet is cut during emergency hatch jettison by which of the following components?
1. Initiator fired cutter
  2. Shaped charge
  3. Explosive bolts
  4. Pneumatic severance cable
- 8-46. Which of the following components in the S-3 egress system replaces pneumatic lines in older egress systems?
1. SMDC segments
  2. Electronic relays
  3. LED arrays
  4. CPUs

- 8-47. Before starting the removal of the ejection seat, which of the following checks should be made?
1. Seat and canopy safety pins are installed
  2. Head knocker in the down position
  3. Pilot and copilot eject mode selector handles in self-eject position
  4. Each of the above
- 8-48. When adjusting the height of the ejection seat, the actuator switch should not be held in the up or down position for more than how many seconds?
1. 10
  2. 15
  3. 20
  4. 25
- 8-49. Which of the following tools is used to disconnect the inertia reel base?
1. Box-end wrench
  2. Open-end wrench
  3. Spanner wrench
  4. Key and flag assembly
- 8-50. When removing the seat, what must be done to prevent injury to maintenance personnel as the seat reaches the top of the guide rails?
1. Disconnect rocket firing lanyard
  2. Safety the M95 initiators
  3. Prevent the yaw vane from deploying
  4. Install the seat balance beam
- 8-51. When performing the face curtain pull test, how many pounds of force is required to unseat the plungers from their retainers?
1. 20  $\pm$ 10 pounds
  2. 30  $\pm$ 10 pounds
  3. 40  $\pm$ 10 pounds
  4. 50  $\pm$ 10 pounds
- 8-52. During ejection seat testing, a force of how many pounds is required to unseat the secondary ejection control from the stowed detent position?
1. 12  $\pm$ 5 pounds
  2. 20  $\pm$ 5 pounds
  3. 25  $\pm$ 2 pounds
  4. 30  $\pm$ 2 pounds
- 8-53. When the secondary ejection control is pulled, it must extend at least how many inches from the stowed position?
1. 0.50 in
  2. 0.75 in
  3. 1.00 in
  4. 1.25 in
- 8-54. If the inertia reel fails the simulated g test, it must be replaced. What is the simulated g force required for this test?
1. 1 g
  2. 2 g
  3. 3 g
  4. 4 g
- 8-55. With the harness release piston in the fully extended position, what should the measurement be between the bottom of the actuator housing and the clevis shoulder?
1. 5.06  $\pm$ 0.03 in
  2. 5.35  $\pm$ 0.05 in
  3. 6.00  $\pm$ 0.50 in
  4. 6.09  $\pm$ 0.07 in
- 8-56. To release the piston from its fired position, what tool(s) is/are used to spread the locking dogs?
1. Spanner wrench
  2. Two 1/4-inch drive extensions
  3. Drift punch
  4. Two 1/8-inch rods
- 8-57. What is the maximum force required to lack the piston in the harness release actuator?
1. 10 pounds
  2. 20 pounds
  3. 30 pounds
  4. 40 pounds



- 8-58. The lap belt and shoulder harness retaining pins should protrude through the seat structure a minimum of how many inches?
1. 0.06 in
  2. 0.19 in
  3. 0.25 in
  4. 0.47 in
- 8-59. Which of the following items is NOT contained in the bottom half of the RSSK-8A-1 survival kit?
1. Life raft
  2. Radio transmitter
  3. Emergency oxygen bottle
  4. Survival kit bag
- 8-60. The seat survival kit oxygen bottle may be actuated by what process?
1. Automatically only
  2. Manually only
  3. Automatically or manually
  4. Pneumatically or electrically
- 8-61. Information for marking initiators is found in which of the following manuals?
1. NAVAIR 01-1A-509
  2. NAVAIR 01-1A-17
  3. NAVAIR 11-85-1
  4. NAVAIR 11-100-1
- 8-62. Egress system pneumatic gas lines have been replaced in later aircraft by which of the following components?
1. Detonating cords
  2. Electrical circuits
  3. Booster initiators
  4. Gallium arsenide connectors
- 8-63. Which of the following components fires the booster cartridge in the rocket catapult?
1. Firing control initiator
  2. Detonating card booster
  3. Ejection delay initiator
  4. Rocket catapult cartridge assembly
- 8-64. Information on disposing of damaged rocket catapults is found in which of the following manuals?
1. NAVAIR 01-1A-17
  2. NAVAIR 01-1A-509
  3. NAVAIR 11-85-1
  4. NAVAIR 11-100-1

# Assignment 9

Textbook Assignment: "Canopy Systems." Pages 6-26 through 6-73.

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Learning Objective:

*Recognize the components, seat system/subsystems, support components, system operations, component test and test equipment, and corrosion control procedures for the Martin-Baker SJU-5/A ejection seat.*

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- 9-1. When the safe/arm handle is in the safe position, the pilot sees the handle as what color?
1. Yellow
  2. Black
  3. White
  3. Red
- 9-2. What initiator provides the gas pressure required to activate the IFF?
1. Right seat initiator
  2. SMDC initiator
  3. Left seat initiator
  4. 0.3-second delay initiator
- 9-3. What force is used to fire the inertia reel cartridge during the ejection sequence?
1. Sear withdrawal
  2. Electrical current
  3. Gas pressure
  4. Heat
- 9-4. What force ignites the primary cartridge within the, catapult?
1. Ballistic gas
  2. Sear removal
  3. Electrical current
  4. Pneumatic pressure
- 9-5. Forward movement of the leg restraints is prevented by what component?
1. Seat bucket
  2. Deck mounts
  3. Locking lugs
  4. Snubbing unit
- 9-4. If the drogue gun primary cartridge fails, what component(s) will fire the secondary cartridge?
1. Rocket motor initiator
  2. Time-release mechanism
  3. Manual override initiator
  4. Both 2 and 3 above
- 9-7. Below what altitude will the 1.5-second timer in the TRM start to operate without interruption?
1. 7,500 feet
  2. 8,000 feet
  3. 8,500 feet
  4. 9,000 feet
- 9-8. When the ejection seat is installed in the aircraft? what component locks it to the catapult?
1. Time-release mechanism
  2. Top latch mechanism
  3. Left main beam
  4. Right main beam
- 9-9. What components absorb the inertia forces encountered during barrel separation?
1. Pressure rings
  2. Guide bushings
  3. Piston rings
  4. Expander bushings
- 9-10. What component locks the guide bushing to the outer barrel?
1. Retaining pin
  2. Dowel screw
  3. Locking plunger
  4. Guide bushing rivet

- 9-11. The seat height actuator rod is attached to what component?
1. Lower cross member
  2. Center cross member
  3. Upper sliding runner
  4. Lower sliding runner
- 9-12. What component holds the moveable jaw of the scissor mechanism in the closed position?
1. Trombone fitting
  2. Drogue gun
  3. Rocket motor
  4. Time-release mechanism
- 9-13. The parachute container houses which of the following parachutes?
1. Controller drogue
  2. Main drogue
  3. Personnel
  4. All of the above
- 9-14. What handle is the only means by which ejection can be initiated?
1. Safe/arm
  2. Face curtain
  3. Ejection central
  4. Manual override
- 9-15. What handle is located on the left side of the seat bucket?
1. Safe/arm
  2. Ejection control
  3. Manual override
  4. Shoulder harness control
- 9-16. During the ejection sequence, gas pressure from what cartridge retracts the pin?
1. Right seat initiator
  2. Left seat initiator
  3. Manual override initiator
  4. Time-release initiator
- 9-17. What barrel(s) of the catapult will remain with the seat during ejection?
1. Inner
  2. Intermediate
  3. Outer
  4. Both 2 and 3 above
- 9-18. By what method is the primary cartridge of the drogue gun fired?
1. Electrically
  2. Mechanically
  3. Pneumatically
  4. Ballistically
- 9-19. What component prevents full upward movement of the manual override handle?
1. Pin puller
  2. Shear rivet
  3. Safety pin
  4. Bell crank assembly
- 9-20. What initiator actuates the pin puller?
1. Right seat
  2. SMDC
  3. Left seat
  4. 0.3-second delay
- 9-21. Gas pressure from the TRM travels through what fitting to fire the cartridge in the manual override initiator?
1. Quick-disconnect
  2. Trombone
  3. Delay
  4. Venturi
- 9-22. During the time-delay test of, the drogue gun. the firing link is pulled from the drogue gun in 0.7 second. Based upon the result, what action, if any, should be taken?
1. Lubricate the firing link
  2. Repeat the test
  3. Replace the drogue gun
  4. None
- 9-23. Before you perform checks on the time-release mechanism, which of the following actions should you take?
1. Disarm the TRM
  2. Remove the TRM from the seat
  3. Inspect the TRM for damage
  4. All of the above

9-24. To obtain satisfactory results in the time delay check-out of the time-release mechanism, the firing link must be pulled from the time-release g-sensing mechanism within what maximum number of seconds?

1. 1.5 ±0.1
2. 1.7 ±0.1
3. 1.8 ±0.1
4. 1.8 ±0.2

9-25. To do a barostat check-out, the test box altimeter must be set to what prescribed millibar value?

1. 1000
2. 1013
3. 1026
4. 1039

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Learning Objective:  
*Recognize the components, parachute and seat separation operations, seat sunsystems, component maintenance, corrosion control, and lubrication and emergency cleaning procedures for the Stencil SJU-8/A ejection seat.*

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9-26. The SJU-8/A seat provides escape capabilities at which of the following ejection parameters?

1. All altitudes and airspeeds
2. Zero altitude and zero airspeed
3. Maximum airspeeds and altitudes of 600 knots and 50,000 feet
4. Both 2 and 3 above

9-27. What total number of operating modes are incorporated in the SJU-8/A ejection seat?

1. One
2. Two
3. Three
4. Four

9-28. What initiator supplies gas pressure to the inertial reel gas-generating initiator?

1. 3.0-second time delay
2. Left M99 ejection
3. Right M99 ejection
4. Seat/man separation

9-29. The catapult cartridge is fired by gas pressure from what device?

1. Inner trombone
2. Multi-time delay
3. Low-speed selector valve
4. Left and right ejection initiators

9-30. Gas pressure is applied to the drogue gun pistons after approximately how many inches of seat travel?

1. 8 in
2. 12 in
3. 16 in
4. 20 in

---

IN ITEM 9-31 THROUGH 9-34, SELECT FROM COLUMN B THE AIRSPEED AND ALTITUDE INFORMATION THAT APPLIES TO THE WIDE IN COLUMN A.

	A. Mode	B. Airspeed and Altitude
9-31.	Mode 1	1. Altitude above 14,000 feet
9-32.	Mode 2	2. Airspeed above 225 knots and altitude below 7,000 feet
9-33.	Mode 3	3. Altitude between 7,000 and 14,000 feet
9-34.	Mode 4	4. Airspeed below 225 knots and altitude below 7,000 feet

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9-35. (Refer to fig. 6-32 and supporting material in the text.) The 0.1-second time delay receives gas pressure from what device?

1. Gas-generating initiator
2. Left--hand inner trombone
3. Right-hand outer trombone
4. Low-speed selector valve

9-35. Under mode 1 conditions, what initiator arms the 14,000-foot aneroid initiator?

1. 0.1-second delay
2. 1.3-second delay
3. 3.0-second delay
4. Left-hand M99 ejection

- 9-37. Under mode 2 conditions, the output of the 0.1-second delay initiation is blocked by what component?
1. Pin puller
  2. Guillotine
  3. Drogue release
  4. Low-speed selector valve
- 9-38. What mode(s) would operate as a backup in the event of mode 2 failure?
1. Mode 1 only
  2. Mode 3 only
  3. Mode 4
  4. Modes 1 and 3
- 9-39. What is the purpose of the 3.0-second time-delay initiator?
1. To arm the 7,000-foot aneroid in mode 2
  2. To arm the 14,000-foot aneroid in mode 3
  3. To fire the guillotine mechanism
  4. To position the low-speed selector valve
- 9-40. The safe and arm control handle safeties what initiator(s)?
1. Left-hand M99 ejection
  2. Right-hand M99 ejection
  3. Seat/man separation
  4. All of the above
- 9-41. What is the total number of ejection control handles incorporated in the SJU-8/A ejection seat?
1. One
  2. Two
  3. Three
  4. Four
- 9-42. The output gas pressure from the two M99 ejection initiators is routed to igniters contained in what device?
1. Word motor
  2. Drogue container
  3. Catapult cartridge
  4. Seat back rocket
- 9-43. Which of the following statements describes the catapult tube assemblies?
1. They provide support for the seat bucket
  2. They house the catapult lock and unlock mechanism
  3. They provide support for the headrest and personnel parachute
  4. All of the above
- 9-44. The catapult lock mechanism consists of a locking piston and what other items?
1. Top latch mechanism
  2. Two retainer rings
  3. Three guide bushings
  4. Six locking balls
- 9-45. The outer trombone assemblies route ballistic gas from the two M99 ejection initiators to the catapult cartridge igniters.
1. True
  2. False
- 9-46. What is the approximate burn time of the seat back rackets?
1. .15 second
  2. .25 second
  3. .35 second
  4. .45 second
- 9-47. Actuation of what component allows the main parachute canopy assembly to deploy?
1. Word bridle
  2. Drogue bridle
  3. Parachute container opener
  4. Word motor
- 9-48. What total number of slugs are contained in the spreader gun assembly?
1. 10
  2. 14
  3. 18
  4. 22
- 9-49. Rotation of the seat pan release rod fires what initiator?
1. Left M99 ejection
  2. Multiple time-delay
  3. 3-second time-delay
  4. Seat/man separation

- 9-50. Gas pressure from the seat/man separation initiator is transmitted to what device(s)?
1. Inertia reel strap guillotine
  2. Drogue release assembly
  2. Parachute container opener
  4. All of the above
- 9-51. When the emergency release handle is pulled, which of the following actions takes place?
1. The seat release shaft rotates
  2. The harness release actuator retracts
  3. The firing central disconnect fitting unseats
  4. The time-release mechanism arms
- 9-52. A full emergency oxygen bottle contains a total of how many cubic inches of oxygen?
1. 30
  2. 40
  3. 50
  4. 60
- 9-53. The emergency oxygen supply lanyard is attached to the bottom of the seat pan and to what other item?
1. Cockpit deck
  2. Safe and arm control handle
  3. Catapult cartridge manifold
  4. Seat release shaft
- 9-54. A properly serviced emergency oxygen system should have what prescribed pressure when the bottle is full?
1. 1200 psi
  2. 1500 psi
  3. 1800 psi
  4. 2100 psi
- 9-55. Automatic actuation of the emergency oxygen supply also provides automatic actuation of the emergency locator beacon.
1. True
  2. False
- 9-56. When performing the safe and arm control assembly check-out, what should be the maximum amount of force required to move the handle to the full up position?
1. 5 pounds
  2. 10 pounds
  3. 15 pounds
  4. 20 pounds
- 9-57. What is the name of the component that block the movement of the initiation rotors?
1. T-bar
  2. Interlock block
  3. Arming key
  4. Trip rod
- 9-58. During the emergency release handle check, the handle should move up with a maximum force of
1. 20 pounds
  2. 30 pounds
  3. 40 pounds
  4. 50 pounds
- 9-59. (Refer to fig. 6-46 and supporting material in the text.) What devices are installed in the separation lanyard retainer assemblies to hold the seat release lanyard bell cranks in place?
1. Trip rods
  2. Shear pins
  3. Cotter pins
  4. Setscrews
- 9-60. The initial breakout force for the ejection control assembly check should be between what maximum number of pounds?
1. 5 and 15 pounds
  2. 15 and 25 pounds
  3. 25 andf 35 pounds
  4. 35 and 45 pounds
- 9-61. When performing the inertial reel check, the force required to extend the risers should be between what maximum number of pounds?
1. 5 and 15 pounds
  2. 15 and 25 pounds
  3. 25 and 35 pounds
  4. 35 and 45 pounds

- 9-62. How many steps are used to complete the seat height adjustment actuator check-out?
1. Five
  2. Two
  3. Three
  4. Four
- 9-63. To prevent heat damage to the height adjustment actuator motor, what are the operating time limits that must be observed?
1. 15 seconds on and 30 seconds off
  2. 30 seconds on and 1 minute off
  3. 30 seconds on and 45 seconds off
  4. 1 minute on and 1 minute off
- 9-64. The airspeed/altitude sensor must be removed to perform the check-out procedure.
1. True
  2. False
- 9-65. Recording to the NA 01-1A-509, ejection seats should be inspected for corrosion control at what minimum interval while at sea?
1. Every day
  2. Every other day
  3. Every 7 days
  4. Every 14 days
- 9-66. VV-L-800 lubricating oil should be applied to all points that slide and used as a corrosion preventive for all bright metal parts.
1. True
  2. False
- 9-67. During emergency cleaning of the ejection seat, what should you use to rinse the seat?
1. Lubricating oil
  2. Fresh water
  3. Safety solvent
  4. Water emulsion cleaner
- 9-68. The MIMs and MRCs for most ejection seat systems provide explicit instructions for corrosion control.
1. True
  2. False
- 9-69. Indiscriminate use of paint, preservatives, or other materials that dry and buildup following application can prevent or restrict proper motion of movable parts.
1. True
  2. False
- 9-70. What color flags are used on ejection seat ground safety pins?
1. Red
  2. Orange
  3. Yellow
  4. Black and white





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